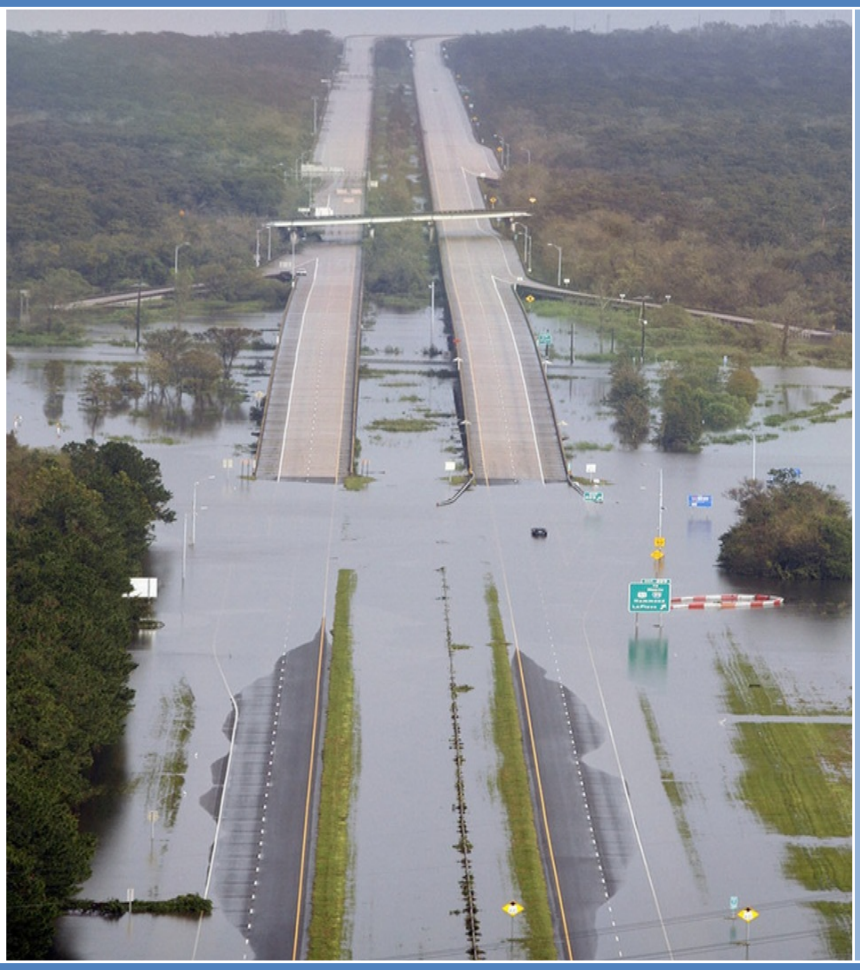
West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study



Final Integrated Feasibility Report and Environmental Impact Statement

US Army Corps of Engineers®

U.S. Army Corps of Engineers
Mississippi Valley Division
New Orleans District

November 2014

Hurricane Isaac flooding in Laplace, Louisiana.

Comments: Please send comments or questions on this Final Integrated Feasibility Report and Environmental Impact Statement to the U.S. Army Corps of Engineers, New Orleans District, Attention: Sandra Stiles, P.O. Box 60267, New Orleans, LA 70160-0267; by e-mail: WSLPAdmin@usace.army.mil or by Fax: (504) 862-1892. Please direct questions by telephone: (504) 862-1583. **The official closing date for receipt of comments will be 30 days from the date on which the Notice of Availability of the document appears in the Federal Register.**

Abstract
(*NEPA Required)

The West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction (WSLP) project proposed by the U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), will provide risk reduction measures to address tropical/hurricane storm surge events in St. Charles, St. John the Baptist and St. James Parishes in southeast Louisiana. Impacts from the National Economic Development (NED) plan are described in this Final Environmental Impact Statement (FEIS).

WSLP communities are at increasing risk to storm surge flooding due to wetland loss and relative sea level rise. The project purpose is to reduce the risk of flood damages caused by hurricane and tropical storm surges. An overview of the entire risk reduction system is shown on Figure 5-1. The Recommended Plan is Alternative C, which includes an 18.27-mile levee around Montz, Laplace, Reserve and Garyville, reducing risk to over 7,000 structures. The construction of the levee system in St. Charles and St. John the Baptist Parishes would be based on a 1% probability storm level of risk reduction (commonly known as a '100-year storm') and a 2020 intermediate sea level rise condition and would include future lifts to maintain that protection.

The recommended plan also includes the construction of localized storm surge risk reduction measures in St. James Parish which includes berms and flapgates on existing drainage and roadway features in the communities of Gramercy, Lutcher and Grand Point which are located outside of the proposed levee system. The Recommended Plan also includes raising 14 residential structures; flood proofing 4 non-residential structures to +3.0 feet above the ground elevation; and constructing 5 smaller berms for 5 light industrial/warehouse facilities. All localized storm surge risk reduction measures will provide a level of risk reduction above a 1% probability storm level of risk reduction storm stage in 2020. Future lifts for the berms, to compensate for any relative sea level rise, are not included as part of this plan. The sponsor is responsible for the operation, maintenance, repair, rehabilitation and replacement (OMRR&R) of the berms at the elevation for which the berms were designed and constructed. That OMRR&R may require lifts to address subsidence or settlement. In the future, the effectiveness of the localized storm surge risk reduction measures would depend on the actual rate of relative sea level rise.

There is a potential for direct, indirect and cumulative impacts to wetlands, wildlife, fisheries, and water quality due to the implementation of the recommended plan. Habitat impacts that require compensation include 1,090 Average Annual Habitat Units (AAHUs) of swamp habitat and 99 AAHUs of bottomland hardwood (BLH) habitat. To compensate for these impacts, the mitigation plan includes restoration of 3,002 acres of swamp, 156 acres of BLH and the purchase of 72 AAHUs of swamp mitigation bank credits (details can be found in Appendix A, Annex K). Mitigation would be constructed in St. Charles, St. James, Ascension, and Livingston Parishes.

Comments: Please send comments or questions on this FEIS to the U.S. Army Corps of Engineers, New Orleans District, Attention: Sandra Stiles, P.O. Box 60267, New Orleans, LA 70160-0267; by e-mail: WSLPAdmin@usace.army.mil; or by Fax: (504) 862-1892. Please direct questions by telephone: (504) 862-1583. The official comment period closing date for this project would be 30 days from the date on which the Notice of Availability of this document appeared in the *Federal Register* (*https://www.federalregister.gov/articles/search*).

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN) prepared this Final Integrated Feasibility Report and Environmental Impact Statement for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction study. The Pontchartrain Levee District is the study non-Federal Sponsor. The Coastal Protection Restoration Authority of Louisiana Board (CPRAB) will be the non-Federal sponsor for the construction, operation, maintenance, repair, rehabilitation and replacement (OMRR&R) of the project. The report and the recommended plan reflect sponsor, agency and public input. It presents solutions to reduce damages from hurricane and tropical storm surge events in St. Charles, St. John the Baptist and St. James Parishes, Louisiana, on the east bank of the Mississippi River.

The area has a bounty of natural resources. Historically it was subject to floods from the Mississippi River and nearby lakes. Settlers built river levees in the 1700s to combat floods. River levees allowed people to settle the area, grow crops and harvest natural resources. The management of Mississippi River flood risks and the development of interior drainage systems allowed urban and suburban expansion into the region beyond the high ground adjacent to the river. The study area has no coastal storm levees and remains susceptible to damages from surges resulting from hurricanes and tropical storms. Some natural buffer protection is afforded by a large cypress swamp that separates developed areas from nearby tidal lakes. The swamp has degraded over time and the buffer it provides between the lakes and towns is decreasing. Population is increasing with suburban and industrial development along the river corridor between Baton Rouge and New Orleans. Residents are attracted to the area's employment opportunities, quality of life and access to recreation. Increasing population and degrading natural buffers combine to increase risk of property damage from hurricane and tropical storm surges. Future anticipated relative sea level rise exacerbates the risks of damage from storm hurricane and tropical storm surge events.

In August 2012, Hurricane Isaac struck the region causing storm surge flooding in the study area. The storm illustrates the risks faced in low-lying communities. President Obama toured the damaged area and met with residents and community leaders. Thousands of residents and businesses were flooded and continue to work towards community recovery today. Key industries line the river corridor. The Port of South Louisiana is the largest volume port in the Western Hemisphere and the world's ninth largest port. It stretches along the Mississippi River between New Orleans and Baton Rouge and plays a critical role in the export of agricultural commodities from the Nation's heartland. Hurricane Isaac disrupted port logistics. Storm surge blocked facility access, closing the port for days. Oil refineries, including the nation's third largest, were shut down during and after the storm due to post-storm emergency response efforts. Gasoline and chemical production stopped; thereby influencing an important industrial sector that supports national energy security. Regional and national fuel prices spiked. The storm caused agricultural losses due to an inability to drain flooded fields. Storm surge flooded ground-level parts of Interstate-10 and access ramps to Interstate-55, two critical transportation routes that support the regional and national economies and play a vital role in repopulation and post-storm recovery.

Eleven management measures were crafted to reduce future damage from hurricane and tropical storm surge events. Structural and nonstructural features included levees, elevating buildings, and flood proofing of structures; the plan also contains compensatory mitigation for unavoidable impacts to bottomland hardwoods and cypress swamp. Measures were combined into 12 alternative plans. After screening, a focused array of four plans was evaluated; a No-Action Alternative, Alternative A, Alternative C and Alternative D. Alternatives A and C consist of nonstructural measures and levee alignments and Alternative D consists of a levee and floodwalls.

The Recommended Plan is Alternative C, an 18.27-mile levee around Montz, Laplace, Reserve and Garyville, reducing storm damage risk to over 7,000 structures. Four miles of I-10 that flooded during Hurricane Isaac are within the proposed risk reduction system. The final Recommended Plan also included localized storm surge risk reduction measures for structures in St. James Parish. The Recommended Plan would prevent an estimated $98 million in total equivalent annual hurricane/tropical storm surge damages during a period of analysis from 2020 to 2070. Areas of controversy include wetland impacts, acceptance of certain nonstructural measures and the potential for induced flooding. All impacts will be mitigated. Coordination of the features in St. James Parish has resolved some local concerns. The estimated construction cost is $718.1 million and annualized net benefits are $63.8 million with a benefit to cost ratio of 2.8. The formulation process also indentified an unjustified project increment that would address other state and local concerns. This unjustified project increment is not included in the recommended plan. This increment, if implemented at all, would be implemented by the State of Louisiana or local entities that is independent of the Federally Recommended Plan. The estimated construction cost of the unjustified increment is $18.2 Million.

Abstract (*NEPA Required) ii
Executive Summary (*NEPA Required) iii
Table of Contents iv
List of Acronyms, Abbreviatons and Symbols viii
1.0 Introduction 1-1
1.1 Background 1-1
1.2 Purpose, Scope, and Need for the Study (*NEPA Required) 1-1
1.3 Problems, Needs and Opportunities 1-2
1.4 Need for Action 1-3
1.5 Objectives of Action 1-3
1.6 USACE Civil Works Guidance and Initiatives 1-4
1.7 Non-Federal Sponsor 1-5
2.0 Affected Environment (*NEPA Required) 2-1
2.1 General Setting 2-1
2.2 Water Environment 2-2
2.3 Human Environment (Socioeconomics) 2-6
2.4 Natural Environment 2-14
2.5 Cumulative Impacts for the Future Without Project Condition 2-24
3.0 Plan Formulation 3-1
3.1 Prior Studies 3-1
3.2 Planning Constraints 3-2
3.3 Management Measures Considered and Screened (*NEPA required) 3-2
3.4 Initial Array of Alternatives (*NEPA required) 3-3
3.5 Final Array of Alternatives (*NEPA required) 3-5
3.6 Cost Estimates 3-7
3.7 Summary of Accounts and Comparison of Alternatives 3-8
3.8 Identifying the Tentatively Selected Plan 3-10
3.9 Additional Plan Formulation 3-10
3.10 TSP Confirmation 3-19
4.0 Environmental Consequences for Comparative Analysis (*NEPA Required) 4-1
4.1 Water Environment 4-1
4.2 Human Environment 4-5
4.3 Natural Environment 4-9
4.4 Cumulative Effects 4-20
4.5 Mitigation Requirements Associated with the Recommended Plan 4-32
5.0 Recommended Plan (Previously Tentatively Selected Plan) (*NEPA Required) 5-1
5.1 Description of the Recommended Plan 5-1
5.2 Hazardous, Toxic, and Radioactive Waste 5-6
5.3 Adaptive Management & Monitoring 5-7
5.4 Real Estate Requirements Associated with the Recommended Plan 5-7
5.5 Relocations with the recommended plan 5-8
5.6 OMRR&R associated with the Recommended Plan 5-8
5.7 Benefit Analysis Associated with the Recommended Plan 5-9
5.8 Risk & Uncertainty Analysis associated with the Recommended Plan 5-9
5.9 Implementation Requirements 5-14
5.10 Views of the Non-Federal Sponsor 5-14
6.0 Environmental Laws & Compliance (*NEPA Required) 6-1
6.1 Clean Air Act of 1972 (Air Quality) 6-1
6.2 Clean Water Act of 1972 – Section 401 (Water Quality) 6-1
6.3 Clean Water Act of 1972 – Section 404(b)(1) (Wetlands) 6-1
6.4 Coastal Zone Management Act of 1972 (Coastal Zone Development) 6-1

6.5 Endangered Species Act of 1973 (Threatened & Endangered Species) 6-1
6.6 Bald and Golden Eagle Protection Act of 1940 (Bald Eagles) 6-1
6.7 Louisiana State T&E Species and Rare and Unique Habitat 6-2
6.8 Colonial Nesting Water Birds 6-2
6.9 Farmland Protection Policy Act of 1981 (Farmland) 6-2
6.10 Fish and Wildlife Coordination Act of 1934 (Fish & Wildlife) 6-2
6.11 Magnuson-Stevens Fishery Conservation and Management Act of 1976 and The Magnuson-Stevens Act Reauthorization of 2006 (Essential Fish Habitat) 6-9
6.12 Marine Mammal Protection Act of 1972 (Marine Mammals) 6-9
6.13 Migratory Bird Treaty Act of 1918 and Migratory Bird Conservation Act of 1929 6-9
6.14 National Historic Preservation Act of 1966 (Cultural and Historic Resources) 6-9
6.15 Resource Conservation and Recovery Act of 1976 6-10
6.16 Wild and Scenic River Act of 1968 (Rivers) 6-10
6.17 Executive Order 11514, Protection and Enhancement of Environmental Quality 6-10
6.18 Executive Order 11988, Floodplain Management 6-10
6.19 Executive Order 11990, Protection of Wetlands 6-13
6.20 Executive Order 12898, Environmental Justice 6-13
6.21 Executive Order 13112, Invasive Species 6-14
6.22 Executive Order 13186, Responsibilities of Fed. Agencies to Protect Migratory Birds 6-14
6.23 Land and Water Conservation Act of 1965 6-14
7.0 Public Involvement 7-1
7.1 Public Meetings and Other Coordination Efforts 7-1
7.2 Draft Report Recipients (*NEPA Required) 7-1
7.3 Views of the Public 7-3
8.0 Recommendations 8-1
8.1 Recommended Plan 8-1
8.2 Plan Implementation 8-2
9.0 List of Preparers (*NEPA Required) 9-1

Map Annex*

Appendices*

Appendix A: Environmental
Appendix B: Engineering
Appendix C: Real Estate
Appendix D: Economics
Appendix E: Plan Formulation
Appendix F: References
Appendix G: Value Engineering

* Full document and appendices are on the enclosed disc included with this document.

List of Tables

Table 1-1 NEPA-required information in this report 1-5
Table 2-1 Project area land use....2-1
Table 2-2 Relative sea level rise in the project area....2-2
Table 2-3 Parish-wide population (in 1000s)....2-6
Table 2-4 Number of households in study area (in 1000s)....2-6
Table 2-5 Summary of parish-wide storm damage insurance payments 1978 through 2012....2-6
Table 2-6 Damages by Probability Event in 2020 and 2070 Intermediate Sea Level Rise....2-7
Table 2-7 Historical parish-wide non-farm employment (in 1000s)....2-8
Table 2-8 Mean height (elevation) of major hurricane evacuation routes....2-9
Table 2-9 Potential transportation impacts....2-10
Table 2-10 Parish-wide per capita income....2-10
Table 2-11 St. James Parish communities percent minority and low income....2-13
Table 2-12 St. Charles Parish communities percent minority and low income....2-13
Table 2-13 St. John the Baptist Parish communities percent minority and low income....2-13
Table 2-14 Essential Fish Habitat for life stages of species in Lake Pontchartrain....2-20
Table 3-1 Relevant prior reports and studies....3-1
Table 3-2 Screening and Ranking Initial Array Plans against Objectives and Constraints....3-4
Table 3-3 Comparative details for final array of alternative plans....3-6
Table 3-4 Estimated first costs for final array of alternative plans....3-8
Table 3-5 Comparison of annual OMRR&R costs for final array of alternative plans....3-8
Table 3-6 Economic comparision of final array of alternative plans on Gross Investment....3-9
Table 3-7 Economic comparision of final array of alternative plans....3-10
Table 3-8 Economic evaluation of potential localized storm surge risk reduction components....3-12
Table 3-9 Additional plan formulation based on environmental factors....3-15
Table 4-1 Relationship between the project impact area and the 3 Parish Area for EJ analysis....4-9
Table 4-2 Sensitive noise receptors within 1000ft impacted from project construction....4-18
Table 4-3 Description of past, present, and reasonably foreseeable future projects....4-21
Table 4-4 Cumulative effects of key significant resources....4-24
Table 4-5 Impacts to swamp and BLH....4-32
Table 4-6 Restored swamp and BLH....4-32
Table 5-1 Total equivalent annual net benefits by flood risk management (FRM) Component....5-9
Table 5-2 Equivalent annual residual damages by components of the recommended plan....5-10
Table 5-3 2020 and 2070 storm stages by components of recommended plan....5-11
Table 5-4 Cost apportionment of the Recommended Plan....5-14
Table 7-1 List of report recipients....7-2

List of Figures in Map Annex

Figure 1-1 West Shore Lake Pontchartrain authorized study area....MA-1
Figure 1-2 Old logging canals in Maurepas Swamp....MA-2
Figure 1-3 Area storm surge patterns....MA-3
Figure 1-4 Hurricane tracks within 65 nautical miles of Laplace, Louisiana....MA-4
Figure 1-5 Hurricane Isaac flooding in Laplace, Louisiana....MA-5
Figure 2-1 WSLP Land Classification Map....MA-6
Figure 2-2 Relative sea level rise in the project area....MA-7
Figure 2-3 Hurricane Isaac flooding in Laplace....MA-8
Figure 2-4 Hurricane Isaac flooding of important transportation routes....MA-9
Figure 2-5 First floor evaluations (existing conditions)....MA-10
Figure 2-6 First floor evaluations (future without-project conditions)....MA-11
Figure 2-7 100YR Still Water Elevations for 2020-Intermediate Condition – Without Project....MA-12
Figure 2-8 100YR Still Water Elevations for 2070-Intermediate Condition – Without Project....MA-13

Figure 2-9 EFH for white shrimp (green) and red drum (red) MA-14
Figure 2-10 Habitats and land loss within the project area MA-15
Figure 3-1 Typical levee, floodwall (T-wall) and control structure MA-16
Figure 3-2 Supplemental nonstructural plan area in St. James Parish MA-17
Figure 3-3 Economic reaches, FWOP condition MA-18
Figure 3-4 Final array of alternative plans. MA-19
Figure 3-5 Alignment and features of Alternative A MA-20
Figure 3-6 Alignment and features of Alternative C MA-21
Figure 3-7 Alignment and features of Alternative D MA-22
Figure 3-8 Study are drainage patterns MA-23
Figure 3-9 Details of further developed nonstructural component MA-24
Figure 3-10 Overview of potential impacts due to a maximum 2 tenths WSE increase MA-25
Figure 3-11 Capability Assessment of Alternative A MA-26
Figure 4-1 Model results of w/and w/o proposed levee alignment on tidal circulation MA-27
Figure 4-2 Modeling simulation flows during month of May for Area 5 ..... MA-28
Figure 4-3 Wetland areas within all alternatives in the final alternative array. MA-29
Figure 5-1 Overview of the entire risk reduction system MA-30
Figure 5-2 Overview of the nonstructural System MA-31
Figure 6-1 Overview of the areas reviewed for Executive Order 11988, Floodplain Management MA-32

LIST OF ACRONYMS, ABBREVIATONS AND SYMBOLS

AAHUs	Average Annual Habitat Units
ACE	Annual Chance Exceedance Event
ACHP	Advisory Council on Historic Properties
ADCIRC	Advanced Circulation Modeling
AEP	Annual exceedance probability
AM&M	Adaptive Management & Monitoring
ARDC	Amite River Diversion Canal
ASACW	Assistant Secretary of the Army for Civil Works
ATV	All Terrain Vehicle
BCR	Benefit to Cost Ratio
BLH	Bottomland hardwood
BLH1	Bonnet Carre Bottomland Hardwood Restoration
BMP	Best management practices
BR	Baton Rouge
CAA	Clean Air Act
CBRD	Convent Blind River Diversion
CC	Coefficient of Conservatism
CEMVN	U.S. Army Corps of Engineers, Mississippi Valley Division, New Orleans District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	Cubic Feet Per Second
CIAP	Coastal Impact Assistance Program
CPRAB	Coastal Protection Restoration Authority of Louisiana Board
CRMS	Coastwide Reference Monitoring System
CWA	Clean Water Act
CWPPRA	Coastal Wetlands Planning, Protection and Restoration Act
cy	Cubic Yards
dBA	A-weighted Decibels
DIVR	Division Regulation
DO	Dissolved oxygen
Draft Report	Draft Integrated Feasibility Report and Environmental Impact Statement
EAD	Equivalent annual damages
EFH	Essential Fish Habitat
EJ	Environmental Justice
EJView	Environmental Protection Agency Mapping
EO	Executive Order
EPA	Environmental Protection Agency
EQ	Environmental Quality
ER	Engineering Regulation
ESA	Environmental Site Assessment
ESA	Endangered Species Act
ESJHS	East St. John High School
FEIS	Final Environmental Impact Statement

FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
Final Report	Final Integrated Feasibility Report and Environmental Impact Statement
FIRM	Flood Insurance rate maps
FPPA	Farmland Protection Policy Act
FQI	Floristic Quality Indices
FRM	Flood risk management
ft	Feet
FWCA	Fish and Wildlife Coordination Act
FWCAR	Coordination Act Report
GIS	Geographic Information System
HEC-FDA	Hydrologic Engineering Center Flood Damage Analysis
HHS	U.S. Department of Health and Human Services
HI	Hydrologic Indices
HSI	Habitat Suitability Index
HSDRRS	Hurricane and Storm Damage Risk Reduction System
HTRW	Hazardous, Toxic and Radioactive Waste
Hwy	Highway
I-10	Interstate 10
I-55	Interstate 55
LaDOTD	Louisiana Department of Transportation and Development
LCA	Louisiana Coastal Area
LDWF	Louisiana Department of Wildlife and Fisheries
LERRD	Land, Easements, Rights-Of-Way, Relocation, and Disposal Areas
LF	Linear Foot
LIDAR	Light Detection and Ranging data
LNHP	Louisiana Natural Heritage Program
LPV	Lake Pontchartrain and Vicinity
MBI	Mitigation Banking Instrument
MII	Micro-Computer Aided Cost Estimating System
MOU	Memorandum of Understanding
MR&T	Mississippi River and Tributaries
MRGO	Mississippi River Gulf Outlet Canal
MRL	Mississippi River Levee
MS	Mississippi
NAAQS	National Ambient Air Quality Standards
NAVD	North American Vertical Datum
NCC	Notice of Construction Completion
NED	National Economic Development
NEPA	National Environmental Policy Act
NER	National Ecosystem Restoration
NFIP	National Flood Insurance Program
NFS	Non-Federal Sponsor
NGO	Non-Governmental Organizations

NOAA	National Oceanic and Atmospheric Administration
NOLA	New Orleans
NORM	Naturally Occurring Radioactive Materials
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OCPR	Office of Coastal Protection and Restoration, Louisiana
OMRR&R	Operation, Maintenance, Repair, Rehabilitation and Replacement
OSE	Other Social Effects
PED	Preconstruction Engineering and Design
PIER 36	Programmatic Individual Environmental Report for Pontchartrain and Vicinity
PLD	Pontchartrain Levee District
PMP	Project Management Plan
Polder	Tract of land enclosed by embankments
PO-29	River Reintroduction into Maurepas Swamp
PPA	Project Partnership Agreement
PPT	Parts Per Thousand
Principles and Guidelines	1983 Economic and Environmental Principles and Guidelines for Water and Related Land Implementation Studies
REC	Recognized Environmental Conditions
RED	Regional Economic Development
REP	Real Estate Plan
ROW	Right of way
RSLR	Relative Sea Level Rise
SHPO	State Historic Preservation Office
SLR	Sea Level Rise
SMART	Specific, Measurable, Attainable, Risk Informed, Timely
STWAVE	Steady-State Spectral Wave
SVI	Submergence Vulnerability Indices
SWMP1	Swamp Mitigation Bank Credit Purchase
SWMP2	Blind River Swamp Restoration
SWMP3	Bonnet Carre Swamp Restoration
SWMP4	Maurepas Crawfish Ponds Restoration
SWMP6	Lutcher Polder Farmlands Swamp Restoration
SWPPP	Storm Water Pollution Prevention Plan
T&E	Threatened and Endangered
TMDL	Total Maximum Daily Load
TSP	Tentatively Selected Plan
TY	Target Year
URA	Uniform Relocation Assistance
US-44	U.S. Highway 44
US-51	U.S. Highway 51
US-61	U.S. Highway 61

USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WIK	Work-In-Kind
WMA	Wildlife Management Area
WRDA	Water Resources Development Act
WSE	Water Surface Elevation
WSLP	West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction
WVA	Wetland Value Assessment

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE) Mississippi Valley Division, New Orleans District (CEMVN) prepared this Final Integrated Feasibility Report and Environmental Impact Statement (Final Report) for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction (WSLP) study. It includes input from both the study and the construction, operation, maintenance, repair, rehabilitation and replacement (OMRR&R) non-Federal sponsors, natural resource agencies, and the public. This report identifies solutions designed to reduce damages from hurricane and tropical storm surge events in St. Charles, St. John the Baptist and St. James Parishes, Louisiana (for additional information see: http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain).

1.1 Background

The study area (see Figure 1-1 in the Map Annex) is in southeast Louisiana between the Mississippi River, and Lakes Maurepas and Pontchartrain. The towns of Montz, Laplace, Reserve, Lutcher, Gramercy, Grand Point, Convent, Garyville and Romeville are area communities. The 235,581 acre area occupies a portion of one of the oldest delta complexes in the Mississippi River Deltaic Plain. It is in the lower Mississippi River alluvial plain in the Pontchartrain Basin. The area includes residential and commercial developments south of Interstate 10 (I-10). West of Laplace, a majority of the developed areas are found between U.S. Highway 61 (US-61) and the Mississippi River levee. The area north of I-10 comprises the State of Louisiana's Maurepas Swamp Wildlife Management Area (WMA). The project area includes lands potentially impacted by the proposed action.

Hurricane or tropical storm winds push on the sea surface, causing a rise of water over and above predicted tides. This is called storm surge. Hurricanes and tropical storms are an important part of Louisiana's history and culture. The region experiences tropical waves, depressions, storms and hurricanes. The study area is highly susceptible to storm surge. The destruction caused by a 1915 hurricane was recounted years later:

> *"… an enormous storm surge advanced with great rapidity upon the western shore of Lake Pontchartrain well ahead of the eye of the hurricane which very nearly struck Frenier head on. As the storm came ashore in the New Orleans area, fifty people drowned as a thirteen foot storm surge swept the Rigolets railroad bridge away. It should also be emphasized that damage and destruction to homes and property were occurring even as the eye of the hurricane was 165 miles from Frenier. Two-hundred seventy-five Louisianians lost their lives as a result of the "Great West Indian Hurricane of 1915."* (Landry 1996)

Recent hurricanes impacting the area include Katrina and Rita in 2005, Gustav and Ike in 2008, and Isaac in 2012. These storms threatened a region that plays a vital national economic role and that serves as a key transportation corridor.

Swamp plays an important role in the natural defense against storm surge. An important swamp buffer that separates development from nearby lakes in the area has been impacted over time due to natural and anthropogenic influences. For example, the closure of bayous and the construction of levees cut off the floods that historically nourished and maintained the cypress/tupelo habitat in the Maurepas Swamp. The cypress forests of the swamp were logged in the 1890s–1930s. Canals and railroads were built through the swamp to remove timber (Figure 1-2). In the early 1970s roadways were built through the swamp further impacting the habitat. Additionally, the area may experience up to 2.32 feet of relative sea level rise (RSLR) over the next 50-years under an "intermediate" RSLR scenario. As a result of these natural and man-made influences, the swamp is converting to fragmented marsh and open water (USACE 2010a, USACE 2010b), and the swamp's surge buffer benefits are expected to continue to diminish as it degrades and disappears and as sea level rises.

1.2 Purpose, Scope, and Need for the Study (*National Environmental Policy Act Required)

The study purpose is to provide a recommendation for Federal participation in hurricane and tropical storm damage risk reduction for St. Charles, St. John the Baptist and St. James Parishes that would be economically and environmentally justified. The study addresses flooding caused by storm surge but does not address

rainfall flooding. There is a need to reduce the risk of damage from hurricanes and storms to the communities in the area. There have been significant changes to the study area's natural and human landscape over the last 40 years. Population has grown over the past few decades, increasing the number of people and business at risk from hurricane and tropical storm surge-related damages. This report presents a collaboratively-developed plan prepared in accordance with the National Environmental Policy Act (NEPA) and Engineering Regulation (ER) 1105-2-100, the USACE Planning Guidance Notebook in accordance with SMART[1] Planning principles and processes. It consists of an integrated feasibility report and EIS, together with associated appendices, and identifies the expected benefits, estimated cost and implementation responsibilities for the recommended plan. The report provides an overview of the study and summarizes the feasibility design of the recommended plan presented in the technical appendices. The report is in response to the study authority.

1.3 Problems, Needs and Opportunities

Problems in the Study Area

1. Storm surge flooding of approximately 7,698 structures (6-8 feet in some areas).
2. Hurricane evacuation routes, for emergency response vehicles, become impassable and are damaged during storm surges events.
3. Agricultural losses resulting from prolonged periods of standing water (e.g., inability to drain saltwater).

Storm surge flooding damages homes, businesses and infrastructure. Surge travels from the Gulf of Mexico into the basin and floods the three study area parishes and beyond (Figure 1-3). Since 1855, 70 hurricanes have made landfall within 65 nautical miles of Laplace (Figure 1-4). Hurricanes Betsy (1965), Camille (1969), Juan (1985), Andrew (1992), Katrina and Rita (2005), Gustav and Ike (2008), and Isaac (2012) caused storm surge flooding. Hurricane Isaac's surge, measured from 6 to 8 feet in the area, threatened lives and damaged more than 7,000 homes, closed roads and disrupted the nationally-significant energy industry (Figure 1-5).

Businesses and workers serving the Port of South Louisiana are located in the area. The port is the largest volume port in the Western Hemisphere and the ninth largest in the world. It stretches 54 miles on the Mississippi River between New Orleans and Baton Rouge. Hurricane Isaac disrupted port logistics. Storm surge blocked facility access closing the port. Oil refineries, including the nation's third largest, were shut down. Gasoline production stopped. Regional and national fuel prices spiked. The storm caused extensive agricultural losses due to an inability to drain storm surge water from fields.

The study area setting offers a bounty of natural resources but historically it has been subject to floods from the river and nearby lakes. Levees were built along the Mississippi River starting in the 1700s to combat annual floods. These levees allowed settlement of the area and agricultural production and the harvesting of natural resources. The area remains susceptible to floods from tropical storms and hurricanes. Some natural protection is afforded by a large cypress swamp that separates developed areas from nearby tidal lakes. The swamp has degraded over time and the storm surge buffer it provides between the lakes and towns is decreasing. As a result, storm surge flooding (Figure 1-3) remains a risk that is expected to increase over time. The management of Mississippi River flood risk, and the accompanying development of interior drainage systems, allowed suburban expansion in much of the region beyond the natural high-ground near the Mississippi River. Population has increased with development between Baton Rouge and New Orleans. Residents are attracted to the area because of employment opportunities, quality of life, and access to recreation. These factors, increasing population and degrading natural buffers, combine to increase storm surge flooding risks.

[1]**SMART**: **S**pecific, **M**easurable, **A**ttainable, **R**isk Informed, **T**imely. In 2012 the USACE revised its approach to planning studies and emphasized risk-based decision-making and early vertical team engagement to effectively execute and deliver feasibility studies in a timely manor.

1.4 Need for Action

The U.S. Congress recognized the need for a hurricane and storm damage risk reduction project in the area. Two Congressional resolutions authorize this study. The first was adopted on July 29, 1971 by the U.S. House of Representatives Committee on Public Works.

> *"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Lake Pontchartrain and Vicinity, Louisiana, published as House Document No. 231, 89th Congress, First Session, and other pertinent reports, with a view to determining whether modifications to the recommendations contained therein are advisable at this time, with particular reference to providing additional levees for hurricane protection and flood control in St. John the Baptist Parish and that part of St. Charles Parish west of the Bonnet Carré Spillway."*

The U.S. Senate Committee on Public Works adopted a resolution on September 20, 1974.

> *"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, that the Board for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Lake Pontchartrain and Vicinity, Louisiana, published as House Document No. 231, 89th Congress, First Session, and other pertinent reports, with a view to determining whether modifications to the recommendations contained therein are advisable at this time, for hurricane protection and flood control in St. James Parish."*

The study was first funded in the 1980s. A 1985 Reconnaissance Report found that there was no justified structural plan suitable for Federal participation. A 1987 reconnaissance report indicated that under Federal criteria a solution could not be found that would be economically justified or environmentally acceptable. Because of increasing population and economic activity, a 1997 reconnaissance report recommended proceeding to a feasibility phase. A Feasibility Cost Share Agreement was executed with the Pontchartrain Levee District (PLD) in 1998. The study stopped in 2002. Following Hurricane Katrina, renewed levee district interest led to an amended agreement in 2008. Planning was underway when Hurricane Isaac hit in 2012. President Obama went to Laplace, Louisiana after the storm to view the damage and visit with residents and local leaders. The President said, ***"We're getting on the case to figure out what happened here and what we can do to make sure it won't happen again."*** The USACE's post-Isaac damage assessment met the first part of the President's commitment. This study will help deliver the second part.

1.5 Objectives of Action

Identifying problems, needs, opportunities, and objectives ensures unity of purpose in the planning process. Solving problems and taking advantage of these opportunities provides a basis for effective solutions. **Critical needs** were identified based on the problems.

Critical Needs in the Study Area

1. Keep hurricane evacuation routes open before and after storms for emergency response vehicles.
2. Reduce property damage.
3. Inform public of increased risk of living in flood prone areas.

Opportunities to solve problems were identified based on these needs.

Study Opportunities

1. Reduce hurricane flood risks and damages.
2. Provide smart growth education.
3. Educate local planners and public officials on potential future stages (e.g. 2070).
4. Improve flood warnings for preparation and/or evacuation.
5. Develop measures to reduce damages to evacuation routes due to storm surge.
6. Recommend future modifications to the roadway systems to maintain emergency response vehicle access during hurricane and tropical storm events.
7. Develop measures to reduce the flood risk to agricultural areas.

A **study goal** based on the problems, needs and opportunities was developed to help create and evaluate alternative plans. It is the overarching intent of the project.

Study Goal
Reduce the risk of storm surge damages.

A **planning objective** states the intended purposes of the planning process. It is a statement of what solutions should try to achieve. Objectives provide a clear statement of the study purpose.

Planning Objectives

1. Reduce hurricane storm surge related damages through 2070.
2. Reduce risk to resident's life and health by decreasing flooding to the maximum extent practical.
3. Increase public awareness of hurricane risks in developed flood prone areas.
4. Enhance public awareness of the risk to life and property of development in flood prone areas.
5. Reduce the risk of damage and loss of critical infrastructure (I-10/I-55 hurricane evacuation routes).

1.6 USACE Civil Works Guidance and Initiatives

USACE planning is grounded in the 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Implementation Studies(hereafter "Principles and Guidelines"). The Principles and Guidelines provide for the formulation of reasonable plans responsive to National, state and local concerns. With this framework, the USACE seeks to balance economic development and environmental needs as it addresses water resources problems. The Federal objective of water and related land resources planning is to contribute to National Economic Development (NED) consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. The Planning Guidance Notebook provides the overall direction to formulate, evaluate and select projects for implementation. The study was conducted under the USACE's Civil Works Planning modernization process by utilizing the SMART planning to effectively execute and deliver the study in a timely manner. The study also meets the USACE Campaign Plan goals and the USACE Environmental Operating Principles by undertaking a proactive public involvement campaign, including a project website, regular stakeholder visits, and targeted stakeholder meetings. Active and responsive public involvement has informed the development of solutions to the problems this study seeks to address, and has facilitated the sharing and distribution of data and knowledge. The relationships that the study team has developed with non-governmental organizations (NGOs), local officials, community and special interest groups, the academic community and agency partners has facilitated the consensus-building process to create a mutually supportable economic and environmentally sustainable solution for the nation.

NEPA requires the USACE to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. Federal regulations to implement NEPA are found in Title 40 Code of Federal Regulations (CFR) Parts 1500-1508. The intent of NEPA is to ensure that information is made available to public officials and citizens about major actions taken by Federal agencies, and to identify and consider public concerns and issues. "*Any environmental document in compliance with NEPA may be combined with any other agency document to reduce duplication and paperwork*" (40 CFR §1506.4). This report integrates discussions that normally would appear in an Final Environmental Impact Statement (FEIS) into the feasibility report. Report sections include NEPA-required discussions marked "*(*NEPA Required)*" in the Table of Contents and in the body of the document to assist readers. Table 1-1 lists the required FEIS information and its location in this document.

1.6.1 NEPA Scoping Process

NEPA provides for an early and open process to determine the scope of issues to be addressed and identify the significant issues related to a proposed action. A Notice of Intent to prepare an FEIS was published in the Federal Register (Volume 73, No. 235) on December 5, 2008. The scoping period ended on February 16, 2009. Scoping identified concerns and preferences for levees. People are concerned about construction times, wetlands, hurricane evacuation routes and funding. The scoping report is available upon request.

Table 1-1: NEPA-required information in this report.

EIS Requirement	Location in this Document
Cover sheet	Cover page
Summary	Executive Summary
Table of Contents	Table of Contents
Purpose of and Need for Action	Chapter 1
Alternatives Including Proposed Action	Chapter 3
Affected Environment	Chapter 2
Environmental Consequences	Chapter 4
List of Preparers	Chapter 9
List of Report Recipients	Chapter 7
Index	Appendix F
Appendices	Listed in the Table of Contents

1.7 Non-Federal Sponsors

The Pontchartrain Levee District is the study non-Federal sponsor (NFS). The Louisiana Coastal Protection and Restoration Authority of Louisiana Board (CPRAB) and the Pontchartrain Levee District will be the NFS for construction, and for OMRR&R.

2.0 AFFECTED ENVIRONMENT (*NEPA Required)

This chapter describes the affected environment. The historic and existing conditions and a forecast of the "future without-project" conditions provide the basis for plan formulation. The future without-project condition is the No Action Alternative. Important resources potentially impacted by the proposed action and their significance are explained in Appendix A. Topics in this chapter mirror Chapter 4 and Chapter 5, where the "future with-project" conditions are considered for screening plans and the recommended plan.

Water use, water supply and ground (drinking) water were assessed and determined to not be significantly affected by the proposed action. These resources will not be further discussed in this report. For more information on other water quality issues see 2.2.3 and Appendix A, Annex M.

2.1 General Setting

Climate: The climate is subtropical marine with long humid summers and short moderate winters. The seasonal rainy period occurs from mid-December to mid-March with dry periods in May, October and November. Average annual rainfall is 60 inches with a monthly maximum of 20 inches. The heaviest rainfalls usually occur during the summer, with July being the wettest month averaging 6.42 inches. October is usually the driest month, averaging 3.01 inches of rain.

Physical Features: The geology of the lower Mississippi River alluvial valley and the Louisiana coast is summarized in the Louisiana Coastal Area (LCA) Ecosystem Restoration Study (USACE 2004). Lakes Maurepas and Pontchartrain occupy a portion of the old Mississippi River pathway known as the St. Bernard Delta. The complex formed in what was then Pontchartrain Bay, enclosing a portion of it to form Lake Pontchartrain. The St. Bernard delta complex was formed by Mississippi River deposits between 3,000 and 4,000 years ago (Frazier 1967). The majority of other landform features include inland swamp, tidal channels, shallow lakes and bays, natural levee ridges along active and abandoned channels, barrier islands and beaches.

Land Use and Land Loss: The 235,581-acre study area contains residential and commercial development south of I-10. West of Laplace most development is between US-61 and the Mississippi River levee. The area north of I-10 is undeveloped wetlands in the Maurepas Swamp WMA. Figure 2-1 and Table 2-1 present various land cover classifications from the most recent land cover database. Land loss is a key environmental factor in coastal Louisiana. The LCA habitat data from 1956 to 2000 shows a trend of landscape changes in the study area (Figure 2-10).

Table 2-1: Project area land use.

Classification Dataset	Acres	Percent of Project area
Open Water	67,262	28.55%
Developed	23,262	9.87%
Barren Land	409	0.17%
Deciduous Forest	17	0.01%
Mixed Forest	5	0.00%
Shrub/Scrub	834	0.35%
Grassland/Herbaceous	88	0.04%

Pasture/Hay	1,827	0.78%
Cultivated Crops	19,895	8.45%
Woody Wetlands	97,817	41.52%
Emergent Herbaceous Wetlands	24,166	10.26%
Total	235,581	100.00%
National Land Cover Database 2011 (NLCD 2011)		

2.2 Water Environment

Water Stage Duration and Frequency: Normal astronomical tides in Louisiana are diurnal (one high tide and one low tide per day) and can have a spring range of as much as 2 feet. The mean tidal range is approximately 0.51 feet (NOAA 2013a). Amplitudes are influenced by tides, but are generally controlled by meteorological events. East winds drive water into the lake.

Relative Sea Level Rise: Sea level rise (SLR) conditions were modeled. Mesh and grid elevations were not adjusted for subsidence in this analysis. Rather, the predicted subsidence levels were incorporated in the initial water level parameter to capture the combined effects of subsidence and local SLR into a single relative sea level rise (RSLR) value. For the 2020 and 2070 hydrology simulations, unique RSLR values were added to the 2011 initial water surface elevations (WSE) to calculate the initial WSE appropriate for each year and SLR rate. SLR and RSLR data is listed in Table 2-2 and shown in Figure 2-2.

Table 2-2: Relative sea level rise in the project area.

Scenario	SLR (NAVD88 feet)		RSLR (NAVD88 feet)	
	2020	2070	2020	2070
Low SLR	0.06	0.33	0.30	1.81
Intermediate SLR	0.10	0.85	0.34	2.32
High SLR	0.23	2.47	0.47	3.95

2.2.1 Flow and Water Levels

Historic and Existing Conditions

Changes in the Mississippi River have been responsible for changes in the flow and water levels in the area over several geological periods. Processes involved in the formation of the various deltaic lobes controlled both water levels and flow directions. Seasonal flooding of the Mississippi River has contributed to the historic flow and water level characteristics of the area. Large flood events would bring freshwater, sediment and nutrients to the back swamp areas.

River levees were built in the area beginning in the 1700s by local landowners and governments. Levee building continued through the settlement period and by 1812, the year Louisiana became a state, levees stretched 130 miles upstream from New Orleans to Baton Rouge. Levees permanently altered the hydrology of the area by preventing riverine flooding and reducing freshwater inputs to the backwater swamps and Lakes Maurepas and Pontchartrain (USACE 2010). The Mississippi River and Tributaries project (MR&T) was authorized by Congress after the Mississippi River Flood of 1927. The project provides flood risk reduction for the Mississippi River and tributaries system from Cape Girardeau, Missouri to the Head of Passes, Louisiana. Although the river is no longer directly connected to Lake Maurepas, it is connected to Lake Pontchartrain through the Inner Harbor Navigational Canal and by openings of the Bonnet Carré Spillway.

The area's water budget is composed of inflows and outflows through precipitation, evaporation, stream flow, base flow; direct groundwater flow, as well as flows in and out of the estuary. Lake Maurepas is a shallow, fresh to intermediate basin, receiving daily mean freshwater discharge, primarily from the Amite and Tickfaw Rivers; and to a lesser extent, the Blind River (American Institute of Hydrology, 2006). Lake Pontchartrain is a shallow, brackish basin that receives freshwater discharge from the Tangipahoa, Pearl, and Tchefuncte Rivers, as well as Bayous Lacombe and Liberty, and many smaller creeks.

LCA restoration projects in the study area are closely related and intended to function together to increase freshwater and nutrient inputs to the Maurepas Swamp (USACE 2004). The LCA Convent Blind River Diversion (CBRD) would introduce Mississippi River water to the Maurepas Swamp near Convent, Louisiana (USACE 2010a). The LCA Amite River Diversion Canal (ARDC) would have modified the canal to spread freshwater into the swamp between the Amite River and the Blind River (USACE 2010b). On December 9, 2011, the USACE and the CPRAB entered into a Design Agreement for six LCA projects, including the CBRD. In a letter dated August 20, 2012 the State of Louisiana suspended further state participation in Federal design efforts for the majority of those projects; however, CPRAB expressed its desire to continue design of the full CBRD feature. Both USACE and the CPRAB desire to proceed with design of CBRD; however, at present further design work is suspended, pending negotiation of a new Project Management Plan (PMP) for the design of the feature. The ARDC project is being pursued by the state and Livingston Parish under the Coastal Impact Assistance Program (CIAP).

The Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) project "River Reintroduction into Maurepas Swamp (PO-29)" would divert Mississippi River water to the Maurepas Swamp through Hope Canal. Construction of this project has transitioned for independent implementation by the State of Louisiana. The WSLP project has been coordinating activities between the project development teams. As part of the WSLP scoping effort, a letter from CPRA (formerly the Office of Coastal Protection and Restoration, Louisiana (OCPR) requested that the CWPPRA project features be incorporated into the WSLP study. The letter emphasized that any storm damage control structure built in the area should allow for the exchange of water in the swamp north and south of I-10. Recently, the State of Louisiana submitted a permit application to construct the project, but for the purposes of the WSLP study, we do not consider the diversion project as a future landscape feature, since the State has not identified funding and has not received approval on the final permits. The USACE will continue to monitor the status of the diversion project.

Because of uncertainty as to the entities that would implement the ARDC and PO-29 diversion projects, further references in this report to the ARDC and PO-29 diversions will be collectively referred to as "Maurepas Swamp Diversions," and will not reference Federal or State responsibility for implementation.

Future Without-Project Conditions (No Action Alternative)

There would be no additional direct, indirect or cumulative impacts caused by the No Action Alternative. Existing conditions and future changes to flow and water levels would continue to change at the predicted trend.

2.2.2 Sedimentation and Erosion

Historic and Existing Conditions

The area has one of the highest land subsidence rates in the country, estimated at 0.4 inches annually. The rate is variable along the coast (Battelle 2005). Coastal Louisiana is more prone than other areas to subsidence and land loss. Human actions have exacerbated the problem.

Shoreline erosion along Lake Maurepas, measured by the United States Geological Survey (USGS) Coastal and Marine Geology Program since 1899, shows an average shoreline loss between 1899 and 1995 of approximately 3.25 feet per year (Zganjar et al. 2002). Erosion may be attributed to any number of factors including storm surge, lack of sediment entering the area, canal construction, logging and wave activity. RSLR

and associated saltwater influx has increased erosion in coastal wetland areas.

Saucier (1963) calculated Lake Pontchartrain shoreline retreat by comparing aerial photographs from 1931 through 1937, with photographs from 1950 through 1954. The data shows average annual erosion for one-mile stretches of shoreline. The southwestern shoreline retreats at a mean rate of 8.9 feet per year compared to 3.6 feet per year for the north shore and about 5.6 feet per year for the south shore. Saucier attributed shoreline erosion to subsidence, lack of sediment input, increasing fetch and SLR.

The Maurepas swamp, which includes the 103,263-acre Maurepas Swamp WMA, is isolated from Mississippi River fresh water, sediment, and nutrient inputs by levees (LDWF 2005). The only soil building in the swamp is from organic wetland production (Shaffer et al. 2003). Area subsidence is classified as intermediate. (Shaffer et al. 2003). When coupled with minimal soil building, net lowering of ground surface elevation results (Shaffer et al. 2003).

The CBRD and the Maurepas Swamp Diversions are intended to sustain this unique swamp system (USACE 2004, 2010a and 2010b). The diversion(s) would increase flow through the southwestern portions of the area, which is intended to provide a constant source of oxygen- and nutrient-rich waters to the swamp. Benefits would include measurable increases in productivity, which could help build swamp substrate and balance subsidence, reduce mortality, and increase soil bulk density. As accretion improves, there could be an increase in recruitment of new cypress and tupelo. Anticipated sediment benefits could include direct contribution to accretion, as well as contribution to biological productivity through the introduction of sediment-associated nutrients, which also could contribute to production of substrate.

Future Without-Project Conditions (No Action Alternative)

There would be no additional direct, indirect or cumulative impacts caused by the No Action Alternative. Existing conditions and trajectories of change to sedimentation and erosion in the area would persist as would potential offsets to those losses by restoration impacts from the CBRD and the Maurepas Swamp Diversions. Soil erosion and land loss would continue at the same or increased rates. Natural and man-made levees would continue to subside and organic soils would not maintain elevations due to subsidence, decreased plant productivity, and wave erosion (USACE 2004). Sediments would continue to be transported from terrestrial areas into Lakes Maurepas and Pontchartrain.

2.2.3 Water Quality and Salinity

Historic and Existing Conditions

Water Quality Influences: Area water quality is influenced by basin elevations, surface water budget, land cover and use, coastal deltaic processes, and regional weather. The study area is in the western portion of the Pontchartrain Basin. The basin is influenced by several rivers which provide freshwater to estuarine lakes connected to each other and, ultimately, to the Gulf of Mexico via several major passes. The estuary has experienced hydro-modification via the construction of canals and embankments such as road and railroad beds and hurricane storm damage risk reduction features (Keddy et al. 2007, Sikora and Kjerive 1985, Tate et al. 2002). The basin includes upland forest and agricultural land north of the estuary, wetlands and open water in the estuary, development and agriculture along the Mississippi River corridor and in nearby urban areas (Demcheck et al. 2004, Brown et al. 2010, Wu and Xu 2007, Turner et al. 2002, Patil and Deng 2008). Chemical transformations occurring in the estuary can be biologically mediated by wetlands (Mitsch and Gosselink 2000). A diversity of wetland types exist in the estuary which are affected by coastal deltaic processes and anthropogenic factors (Gosselink 1984, Keddy et al. 2007). Weather patterns can affect estuary marine influence, flow direction, water level, and wetlands biogeochemistry (Gosselink 1984). Timing and amount of precipitation can also affect water quality (Demcheck et al. 2004, Keddy et al. 2007).

Literature Review: Development in the basin in the 20th century led to degradation of estuary waters (Hastings 2009). Historical pollution sources include sewage discharges, increased urbanization and farming, mining of water bottoms, and oil and gas activities. While recently many of these sources are curtailed or eliminated,

urbanization and farming are increasing (Patil and Deng 2008, Brown et al. 2010, Turner et al. 2002, Wu and Xu 2007). Garrison (1999) provides a water quality summary for data collected in Lake Maurepas from 1943-1995. Sikora and Kjerve (1985) and Tate et al (2002) both compared pre-/post-Mississippi River Gulf Outlet Canal (MRGO) salinity trends, finding a 0.2-0.4 parts per thousand (PPT) increase at Pass Manchac. Patil and Deng (2008) investigated water quality of the Amite River; dissolved oxygen (DO) levels in the river decreased by 1 mg/L between 1975-1990 and 1991-2005. Findings of the study implicate continued mining in the river and increased urbanization of the watershed. Recently, a total maximum daily load (TMDL) for the river for DO was developed (LDEQ 2011). Studies were conducted in support of the diversion of Mississippi River water into the Maurepas Swamps (e.g., Lee Wilson and Associates 2001, Shaffer et al. 2003, Hoeppner et al. 2008, Lane et al. 2003, Shaffer et al. 2009), and discuss water quality, and suggest that diversions may be beneficial during droughts.

Louisiana Water Quality Inventory: Historical (1998-2012) Clean Water Act Section 305(b) assessments of study area sub-segments were evaluated. For each sub-segment, an average designated use support value was calculated (0=always impaired, 1=unimpaired; see Appendix A, Annex M for methodology and details). Long-term average support values reveal that impairments are commonplace in sub-segments west of the Maurepas land bridge. The most commonly suspected causes included in the 305(b) assessments were non-native aquatic plants; low DO, mercury, fecal coliform, total phosphorus, sedimentation/siltation, and elevated turbidity, while the most commonly suspected sources were unknown sources such as atmospheric deposition, introduction of non-native organisms, on-site treatment systems, wetland habitat modification, and site clearance for land development/redevelopment. In the current (2012) 305(b) assessment, the most frequently cited suspected causes of impairment include non-native aquatic plants, low DO, mercury, elevated turbidity, and fecal coliform, while most frequently cited suspected sources of impairment include wetland habitat modification, introduction of non-native organisms, atmospheric deposition, unknown sources, on-site treatment systems, natural sources, and agriculture.

Water Quality Monitoring: See Appendix A, Annex M for water quality details. For each monitoring station in the study area, data for selected parameters was summarized by means of box plots (overall and seasonal), quantile plots and trend analysis. Findings suggest differences in water quality based on habitat, salinity and season. Low DO is common in the Maurepas Swamp. Pass Manchac is experiencing increased marine influence.

Future Without-Project Conditions (No Action Alternative)

Direct and Indirect Impacts: There would be no direct impacts. DO and salinity gradient trends are expected to continue. Without a project there would be an increased risk of damage from storm surge resulting from hurricane and tropical storm events in the area. Drainage of storm waters containing elevated nutrients, metals, and organics into water bodies connected to the Maurepas Swamp and Lake Maurepas is a possibility (Farris et al. 2007). Without the proposed project, the area would still be affected by the following:

- Restoration and Other Efforts – the LCA CBRD project (USACE 2010a) has the potential to locally reduce salinity stress and improve DO. Multiple diversion projects throughout the Pontchartrain Basin may concurrently have the potential to generate significant changes in wetlands biogeochemistry, some of which may negatively affect wetland plant community resiliency (Swarzenski et al. 2005).
- Federal and state water quality programs – may address land use practices in the Mississippi River basin and could impact the area water quality (Broussard 2008).
- Coastal processes – the Maurepas Swamp is anticipated to continue to decline and convert to marsh and open water, in turn affecting local water quality conditions.
- Development – development in watersheds affecting the study area.
- Climate change, sea-level rise and hurricane/tropical storm surge frequency may impact water quality through increased frequency of saltwater intrusion (Mousavi et al. 2011).

2.3 Human Environment (Socioeconomics)

2.3.1 Population and Housing

Historic and Existing Conditions

Table 2-3 shows the population trend in the three-parish area. Population increases between 2000 and 2010 are likely the result of population influx after Hurricane Katrina (2005). The three parish total population in 2010 was 120,806 residents. The 2012 population in the three parishes declined to 119,161 (U.S. Census 2013) due mainly to Hurricane Isaac impacts.

Table 2-3: Parish-wide populations (in 1000s). (U.S. Census 2013)

Parish	1970	1980	1990	2000	2010
St. Charles	29.5	37.5	42.5	48.2	52.8
St. James	19.7	21.6	20.8	21.4	22.1
St. John the Baptist	23.8	32.3	40.1	43.1	45.9
Total	**73.0**	**91.4**	**103.4**	**112.7**	**120.8**

The 2012 study area population was 62,900 residents. Housing trends (Table 2-4) parallel population growth. Almost all residential and non-residential development is on the higher ground adjacent to the Mississippi River. Major area communities include: Laplace, the largest urban area in the study; Reserve and Garyville in St. John the Baptist Parish; Gramercy and Lutcher in St. James Parish; and Montz in St. Charles Parish. The area was most recently flooded by Hurricane Isaac (2012) storm surge (Figure 2-3 and Figure 2-4).

Table 2-4: Number of households in study area (in 1000s). (U.S. Census 2013)

Parish	1970	1980	1990	2000	2010
St. Charles	7.59	11.6	14.4	16.5	17.2
St. James	4.63	6.1	6.4	7.0	6.9
St. John the Baptist	5.77	9.4	12.7	14.3	15.1
Total	**17.99**	**27.1**	**33.5**	**37.8**	**39.2**

Approximately 20,000 residential structures were inventoried in the study area. Federal Emergency Management Agency (FEMA) data indicates storm surge and rainfall flood claims for the three parishes were paid between 1978 and 2012 totaling $338 million (Table 2-5). Evaluations show that under the modeled 100-year storm surge conditions approximately 7,689 structures' first floors would potentially be inundated under the existing conditions. First floor elevations were determined via field approximations (Figure 2-5).

Table 2-5: Summary of parish-wide storm damage insurance payments 1978 through 2012. (FEMA 2013)

Parish	# of Claims	Total Nominal Dollar Amount (in millions)	Average Dollar Amount per Claim
St. Charles	5907	$100.13	$16,950
St. James	135	$1.74	$12,870
St. John the Baptist	4851	$236.18	$48,690
Total	**10898**	**$338.05**	**$31,030**

Future Without-Project Conditions (No Action Alternative)

Population and housing are expected to follow trends in the local, regional, and national economies. An increase of 33,000 residents and approximately 11,000 residential structures are projected. In the absence of storm surge damage risk management measures population and housing could be adversely affected.

Evaluations of the future without-project conditions showed that under the modeled 100-year storm surge conditions 14,486 structures' first floors would potentially be inundated under the 2070 intermediate RSLR conditions (Figure 2-6). One or a series of catastrophic hurricane/tropical storm surge events would result in severe negative impacts to residents and cause significant damage to structures.

In modeling the future without-project conditions it was determined that there are significant damages starting at the 4 percent (25 yr) Annual Chance Exceedance Event (ACE) (Table 2-6). As the RSLR increases in the future, the extent of the storm surge extends further west into the study area (Figure 2-7 and Figure 2-8) causing additional damages. The total equivalent annual damages (EAD) without project damages during the period of analysis; 2020 to 2070; based on 2012 prices were approximately $190 Million. Additional information on the without-project condition damages by specific economic reaches can be found in Appendix D within Table 17.

Table 2-6: Damages by Probability Event in 2020 and 2070 Intermediate RSLR
Residential, Non-Residential, Mobile Homes and Industrial
Existing and Future Without-Project Conditions
(Damages in Millions using 2012 Price Levels)

Annual Chance Exceedance Event	Residential	Non-Residential	Mobile Home	IND	Total
Base year 2020					
0.99 (1 yr)	$0.00	$0.00	$0.00	$0.00	$0.00
0.20 (5 yr)	$0.00	$0.00	$0.00	$0.00	$0.00
0.10 (10 yr)	$0.81	$1.32	$0.05	$0.00	$2.17
0.04 (25 yr)	$45.69	$17.62	$0.45	$0.00	$63.76
0.02 (50 yr)	$492.04	$112.85	$3.74	$0.01	$608.65
0.01 (100 yr)	$1,060.30	$177.28	$6.77	$0.34	$1,244.69
0.005 (200 yr)	$1,428.44	$402.94	$11.24	$0.69	$1,843.30
0.002 (500 yr)	$1,634.42	$526.76	$13.30	$0.88	$2,175.36
Future year 2070 Intermediate RSLR					
0.99 (1 yr)	$0.09	$0.04	$0.00	$0.00	$0.13
0.20 (5 yr)	$9.02	$1.03	$0.15	$0.00	$10.20
0.10 (10 yr)	$154.13	$59.33	$1.50	$0.13	$215.09
0.04 (25 yr)	$472.49	$117.00	$3.75	$0.59	$593.82
0.02 (50 yr)	$1,741.94	$642.69	$15.15	$1.73	$2,401.51
0.01 (100 yr)	$2,966.93	$1,492.51	$21.19	$1.83	$4,482.45
0.005 (200 yr)	$3,687.30	$1,766.87	$24.87	$1.83	$5,480.88
0.002 (500 yr)	$4,059.89	$2,067.55	$28.04	$1.83	$6,157.31

Additionally, residents in these communities could potentially incur higher insurance premiums offered by the National Flood Insurance Program (NFIP) should flood insurance rate maps (FIRM) be updated to reflect an increase in storm damage risk over time.

Direct and Indirect Impacts: The No Action Alternative would have no direct impacts. Indirect impacts would include a potential for permanent displacement of population as residents relocate to areas with less risk.

2.3.2 Employment, Business, and Industrial Activity (including Agriculture)

Historic and Existing Conditions

Table 2-7 shows the growth of non-farm employment in the three-parish-wide area. Increase in employment is likely the result of the influx of population and businesses after Hurricane Katrina (2005). Leading employment sectors include education, health care and social assistance, manufacturing, and retail. Approximately 1,900 non-residential structures are in the area including: petroleum services and river services companies, Zapp's Potato Chip Factory and the Marathon refinery. Approximately 10 percent of the area (23,800 acres) is devoted to agriculture, and about half of these acres are sugar cane crops. This percentage differs from land use percentages described in Table 2-10, which indicates only 543 acres are in agriculture. This apparent discrepancy is because the data was developed for land loss comparisons in the LCA (2004) study; land uses in over 40 percent of the study area were not included.

Table 2-7: Historical parish-wide non-farm employment (in 1000s). (Moody's 2013)

Parish	1970	1980	1990	2000	2010
St. Charles	9.0	18.1	18.5	20.1	24.3
St. John the Baptist	5.4	9.8	9.4	7.6	8.1
St. James	4.2	9.4	11.0	13.4	15.0
Total	**18.5**	**37.2**	**39.0**	**41.1**	**47.4**

Future Without-Project Conditions (No Action Alternative)

Growth in employment, business and industrial activity is expected to follow economic trends in the local, regional, and national economies. An additional 22,790 jobs are projected by the year 2080. However, without flood risk management alternatives, the stability of employment, business and industrial activity could be adversely affected. One or more catastrophic hurricane/tropical storm surge events could result in severe negative impacts to employment and business activity and cause significant damage to non-residential structures. Additionally, business owners in these communities could potentially incur higher flood insurance premiums should the FIRMs be updated to reflect an increase in flood risk over time.

Direct and Indirect Impacts: The No Action Alternative would have no direct impacts. Indirect impacts would include a higher potential for temporary interruption or permanent displacement of employment, business, and industrial activity as businesses temporarily or permanently relocate to areas with less storm damage risk.

2.3.3 Public Facilities and Services

Historic and Existing Conditions

Public facilities and services have historically grown to meet population demands. The area includes a mixture of community centers, schools, hospitals, police, and fire protection. An airport, technical college, and facilities associated with the Port of South Louisiana are located in the area. During the threat of hurricanes and severe storms public buildings are occasionally used for shelter. A total of 402 public and quasi-public buildings were inventoried to calculate damages in the three-parish area in 2012.

Future Without-Project Conditions (No Action Alternative)

Public facilities and services are expected to grow with the needs of the population and would follow growth trends. In addition to the 402 public and quasi-public buildings, an additional 165 such facilities are projected by 2070. These facilities would be more susceptible to damages resulting from hurricane/tropical storm surge events. The increased risk of damage to public facilities and the resulting temporary and/or permanent relocation of these facilities would have a negative impact on services.

Direct and Indirect Impacts: There would be no direct impacts. Indirect impacts would include a greater potential for permanent displacement of public facilities and services due to hurricane/tropical storm surge events.

2.3.4 Transportation

Historic and Existing Conditions

Transportation infrastructure includes major roads and navigable waterways that have developed historically to meet the needs of the public. I-10, an east-west route connecting New Orleans and Baton Rouge, crosses the northern part of the area and is a primary hurricane evacuation route. US-61, another evacuation route through the project area, is located south of I-10 and is the northern boundary of the local industrial sector in the area. Most of I-10 and US-61 are either just below or just above the 100-year floodplain. Other major highways in the project area include Interstate 55 (I-55), which runs north-south and intersects I-10 in the northeastern portion of Laplace; U.S. Highway 44 (US-44), which is located in the southern portion of the project area and runs parallel to the Mississippi River; and U.S. Highway 51 (US-51), which runs north-south through Laplace and parallels I-55.

Other transportation modes in the area include water transport along the Mississippi River via vessels and barges, rail, and aviation via the St. John the Baptist Parish airport. Of the three area railroads, two are owned by Canadian National Railroad and one is owned by Kansas City Southern Railroad.

During Hurricanes Ike and Isaac portions of US-61, I-10, and the I-10/I-55 interchange were inundated by a combination of storm surge and rainfall (See Table 2-8 identifying reaches that flooded during Hurricane Isaac). This interfered with emergency service access and prevented local and regional residents from returning to their primary residence. This delay in re-population equates to higher emergency costs during storm events, due to the longer time periods required for sheltering residents until the area is made safe to return. There is also the added travel time and cost for taking alternative routes during re-population following tropical storm events.

Travel from Baton Rouge (BR) to New Orleans (NOLA) typically takes approximately 1.5 hours without traffic delays. If access routes are congested this extends to two hours (Table 2-9). Most of the alternative routes are on local roads. Traffic congestion on local roads could extend travel time.

Table 2-8: Mean height (elevation) of major hurricane evacuation routes.

Highway Reach	Mean Height (ft. NAVD 88)	Length (miles)	Type
I-10 Laplace Area	**5.42**	**3.76**	**4 lanes divided**
I-10 Reserve Canal Underpass to Mississippi Bayou	7.58	0.88	4 lanes divided
I-10 Mississippi Bayou to Hope Canal	7.91	3.39	4 lanes divided
I-10 Hope Canal to Gramercy Exit	8.28	2.30	4 lanes divided
I-10 Gramercy to Blind River	7.66	1.80	4 lanes divided
I-10 Blind River to Bayou Conway	7.64	2.53	4 lanes divided
US-61 Last Reach	**5.65**	**0.65**	**4 lanes divided**
US-61 Last Reach to Pipeline	5.78	1.55	4 lanes divided
US-61 Pipeline to Boatclub	5.72	1.84	4 lanes divided
US-61 Boatclub to Canal	6.14	0.98	4 lanes divided
US-61 Low area	**5.51**	**1.12**	**4 lanes divided**
US-61 Low area to Gramercy	6.15	0.21	4 lanes divided
US-61 Gramercy Exit	**6.28**	**3.21**	**2 lanes**

*Reaches shown in **bold** flooded during Hurricane Isaac.

Future Without-Project Conditions (No Action Alternative)

Transportation infrastructure would be more susceptible to damage from hurricane/tropical storm surge events. There would be an increased risk that access to infrastructure would be reduced due to storm surge.

Direct and Indirect Impacts: With no action there would be no direct impacts. Indirect impacts would include a higher potential for damages to transportation infrastructure in the area as a result of hurricane/tropical

storm surge events, coupled with the interruption of use by emergency responders and residents.

Table 2-9: Potential transportation impacts.

Scenario	Travel Distance BR to NOLA	Average Travel Time* BR to NOLA	Added Travel Distance from Scenario # 1	Average Added Travel Time from Scenario # 1	Comments
Scenario #1: No Impacts	83.90 miles	1.43 hours	-	-	-
No access to I-10	96.30 miles	1.70 hours	12.40 miles	16 mins	No exit to Laplace Area
I-10 impacted between Laplace and Belle Terre exits	87.50 miles	1.60 hours	3.60 miles	10 mins	4 lane local highway ~ 13 stop lights
I-10 impacted between Gramercy /Lutcher and Belle Terre exits	88.60 miles	1.67 hours	4.70 miles	14 mins	4 lane local highway ~ 19 stop lights
I-10 impacted between Sorrento and Gramercy/Lutcher exits	89.90 miles	1.63 hours	6.00 miles	12 mins	4 lane local highway ~ 20 stop lights
I-10 and US-61 impacted thru Maurepas Swamp	91.70 miles	1.83 hours	7.80 miles	24 mins	2 lane local roadway >20 stop lights

*__BR__ = Baton Rouge. __NOLA__ = New Orleans; travel times are based on number of lanes, distances and speed limits. Road conditions (e.g. traffic density) were not factored into calculations.

2.3.5 Community and Regional Growth

Historic and Existing Conditions

Community and regional growth are influenced by national trends, but depend significantly upon local attributes. Table 2-10 shows per capita income growth since 2000 in the area. Growth has been aided by the flood risk reduction provided by the MR&T levee system.

Table 2-10: Parish-wide per capita income. (U.S. Census 2013)

Parish	1990	2000	2010	2012
St. Charles	$17,297	$24,228	$32,599	$34,992
St. John the Baptist	$14,231	$18,327	$29,663	$31,492
St. James	$14,440	$19,720	$29,351	$31,349

Future Without-Project Conditions (No Action Alternative)

Risk reduction from hurricane/tropical storm surges would not be provided for communities in the project area. Property owners in these communities could potentially incur higher flood insurance premiums should FIRMs be updated to reflect an increase over time in the risk of storm surge damage. While community and regional growth is expected to follow national and local economic trends, increased insurance premiums associated with damage resulting from hurricane/tropical storm surge events could have a negative impact on community and regional growth relative to areas with lower flood insurance premiums.

Direct and Indirect Impacts: With no action there would be no direct impact. Indirect impacts under the No Action Alternative would include a higher potential for less community and regional growth due to increasing risk of damage from hurricane/tropical storm surge events.

2.3.6 Tax Revenues and Property Values

Historic and Existing Conditions

Damages from hurricane/tropical storm surge events can significantly impact businesses, industries, farms, property values, local employment and income, which then negatively impacts the tax base created by these activities. Reduction in the risk of damages from hurricane/tropical storm surge events can have a commensurate positive impact on tax revenues and property values. Conversely, the lack of reduction of risk of damages from hurricane/tropical storm surge events in areas highly susceptible to these damages could limit the growth of tax revenues and property values.

Residential (19,958) and non-residential (1,882) structures were inventoried to calculate potential storm-related damages. The median value of owner-occupied housing units are $175,200 in St. Charles Parish, $114,000 in St. James Parish, and $148,800 in St. John the Baptist Parish. Future losses to these properties will tend to reduce tax revenues.

Future Without-Project Conditions (No Action Alternative)

Growth in tax revenues and property values are expected to follow local, regional and national economic trends. However, without storm surge damage risk reduction measures, the economic stability, tax revenues and property values could be adversely affected. Community residents could incur higher flood insurance premiums should FIRMs be updated to reflect an increase over time in the risk of damage from hurricane/tropical storm surge events. Higher insurance premiums could negatively affect property values.

Direct and Indirect Impacts: There would be no direct impacts under the No Action Alternative. Indirect impacts could include lower tax revenues as property values decline due to high risk of damage from storm surge events and residents and businesses relocate to lower-risk areas.

2.3.7 Community Cohesion

Historic and Existing Conditions

Community cohesion is based on the characteristics that keep the members of the group together long enough to establish meaningful interactions, common institutions, and agreed upon ways of behavior. These characteristics include race, education, income, ethnicity, religion, language, and mutual economic and social benefits. The project area, which was originally settled in the 1700s, is comprised of communities with established public and social institutions including places of worship, schools, and community interaction.

The construction of water resource projects can impact community cohesion in different ways. For example, prior to the Great Flood of 1927, the area was subject to periodic riverine flood damage events from the Mississippi River. However, with the construction of the MR&T levee system, the risk of inundation from the river has been greatly reduced and the community cohesion of the area was positively impacted.

The area is highly susceptible to storm surge damage. In August 2012, communities in St. John the Baptist Parish, including the town of Laplace, were inundated by the storm surge from Hurricane Isaac. The study area does not currently have a storm surge damage risk reduction system in place. Hence, following Hurricane Isaac, local populations where temporarily forced to relocate thereby disrupting community cohesion.

Future Without-Project Conditions (No Action Alternative)

The area will become more susceptible to damage caused by hurricane/tropical storm surge events that is projected to increase over the period of analysis. The increased risk of damage to residential and non-residential structures and the resulting temporary and/or permanent relocation of populations would negatively affect the community cohesion in many communities.

Direct and Indirect Impacts: There would be no direct impacts. Indirect impacts would include a higher potential for a reduction in community cohesion if the civic infrastructure in the area continues to be damaged as a result of hurricane/tropical storm surge events. Community cohesion may be reduced if residents and businesses relocate to lower-risk areas.

2.3.8 Environmental Justice

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was signed by President Clinton in 1994. It directs federal agencies, "to the greatest extent practicable and permitted by law, to make achieving environmental justice (EJ) part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions…" As directed, the USACE has developed an analysis methodology to evaluate EJ areas affected by water resource projects that are consistent with Environmental Protection Agency (EPA) recommendations, USACE policy, and Executive Order 12898.

For a full picture of the potential EJ related impacts included in this analysis, the overall Socioeconomics Section and Other Social Effects (OSE) appendices should be viewed. To assist agencies in identifying potential EJ communities, the EPA recommends using two types of analysis to assess population demographics: (1) the meaningfully greater analysis; and (2) the general 50 percent analysis. To avoid diluting the affected population in large areas, assessment of the meaningfully greater population is generally the recommended approach. However, because of the type of project proposed, the presence of existing levee systems in the project vicinity, the low population density in the western portion of the study area, and the results of the overall socioeconomic analysis, the decision was made to utilize the 50 percent analysis. Selection of this assessment methodology has been coordinated with EPA.

A potential disproportionate impact may occur when the percent minority and/or low-income population in an area is greater than those in the reference community, which in this instance has been defined as the 3-parish area of St. John the Baptist, St. James and St. Charles. To assess for potential disproportionate impacts, the team identified low-income and minority populations within the study area using 2010 U.S. Census records (parish and city/town), aerial photographs, EPA mapping (EJView), and poverty thresholds as described by the U.S. Department of Health and Human Services (HHS), which currently includes areas above 20 percent of a population. Overall parish figures were used, however, because a significant portion of the study area is located on the east bank of the Mississippi River, the decision was made, in consultation with EPA, to also examine census tracts and block groups in order to obtain a more accurate estimate of the demographics located on the east bank of the Mississippi River to further assist in identifying potential EJ communities in the project area.

Following the identification of potential communities of concern, additional community outreach activities including canvassing neighborhoods (door-to-door contact), posting informational flyers in public places such as schools and libraries; and conducting small neighborhood meetings were utilized. These public involvement strategies are consistent with EPA recommendations, Corps policy, and EO 12898.

Historic and Existing Conditions:

The study area has historically been utilized as farm land, and later as residential, commercial, and industrial land with much of St. James Parish remaining largely underdeveloped. Tables 2-11, 2-12 and 2-13, which are broken down by parishes, identified the percent minority and low-income population by community that could potentially be impacted by the proposed action. Analysis of the tabled results is presented below.

Table 2-11: St. James Parish communities percent minority and low income.

Total Population	22,102	3,613	3,559	2,473	711
% Minority	53%	49%	54%	27%	69%
% Low Income	15%	13%	21%	8%	10%
Census Tract	N/A	N/A	LA093040200	N/A	N/A
Census Block Group(s)	N/A	LA0930401001	LA0930402001 LA0930402002 LA0930402003 LA0930402004	N/A	N/A

***Includes total parish population demographics.**

Table 2-12: St. Charles Parish communities percent minority and low income.

	St. Charles Parish*	Montz
Total Population	52,880	1,918
% Minority	35%	22%
% Low Income	13%	0%
Census Tract	N/A	N/A
Census Block Group(s)	N/A	N/A

***Includes total parish percent minority and low income.**

Table 2-13: St. John the Baptist Parish communities percent minority and low income.

	St. John the Baptist Parish*	Laplace	Reserve	Garyville
Total Population	45,824	29,872	9,766	2,811
% Minority	61%	59%	65%	54%
% Low Income	15%	9%	20%	8%
Census Tract	N/A	LA095070400 LA095070500 LA09507900 LA095071000	LA095070500 LA095070700 LA095070800	LA095070600
Census Block Group(s)	N/A	LA0950703003 LA0950709001	LA0950705001 LA0950707001 LA0950707002 LA0950707003 LA0950707005 LA0950708001 LA0950708002	LA0950706001 LA0950706002

***Includes total parish percent minority and income.**

Based on the above data, St. James and St. John the Baptist Parishes have majority minority populations. To avoid artificially diluting the results of the analysis and to further identify vulnerable groups that may exist within these parishes at a smaller level, the census tracts and block groups were assessed. The communities of Lutcher and Convent (in St. James Parish), and Reserve, Laplace and Garyville (in St. John the Baptist Parish) were identified as having majority minority populations, and therefore are identified as areas of potential EJ concerns. Specific EJ communities that could be affected under with-project conditions are discussed in Section 5.2.2.8.

No-Action Alternative (FWOP condition) Direct and Indirect Impacts

Direct impacts would be those associated with existing and future rain/flood induced damages to communities and property in low lying areas caused by hurricane and tropical storm surge events. Indirect impacts include continued degradation of wetlands between Lakes Maurepas and Pontchartrain and communities on the east bank of the Mississippi River. These wetlands currently provide a buffer from hurricane and tropical storm surge risk for minority and low-income residents in the area. Under the no action alternative, residents would continue to incur costs associated with damages to structures, utilities, infrastructure, and the local economy following major storm events.

People living and working in the area, irrespective of race or income, would be impacted by storm surge events in the future without project condition. There could be disproportionate impacts on low-income residents in a mandatory evacuation due to the lack of financial resources. However, Federal, state, parish and local programs are available to assist all residents in the evacuation and rebuilding process after storms.

2.4 Natural Environment

2.4.1 Soils, Water Bottoms and Prime and Unique Farmlands

Historic and Existing Conditions: Soils are hydric and non-hydric. Most of the undeveloped area is forested wetlands/swamp habitat comprised of the Barbary-Sharkey soil association. The Convent-Silty alluvial land association is found immediately along the Mississippi River. The Commerce-Sharkey soil association is primarily found on agricultural and undeveloped lands. Convent-Commerce-Sharkey soil association and Convent-Barbary soil association are typically found in undeveloped and rural/suburban/urban developed areas, respectively (USDA 2013).

Water bottoms include Lakes Maurepas and Pontchartrain; the Mississippi and Blind Rivers; Mississippi Bayou and Bayou Fusil; parish canals, such as the Reserve Relief Canal, Hope Canal, and Godchaux Canal; and shallow swamp, ponds and sloughs. Lakes Pontchartrain and Maurepas, and the Mississippi River are state water bottoms. Because of the typical stagnant swamp conditions, the loss of sediment inputs, reduced primary productivity, and limited consolidation, net phosphorus and organic matter export from the swamp is likely low. Therefore, support for dependent systems downstream (e.g., Lake Maurepas) is likely limited and substantially reduced from historic levels (USACE 2010b).

Historically, forested wetlands, swamps and associated water bottoms were typically subjected to flooding and drying events. Water bottoms provided an outwelling of organic matter (Odum 1980) and a sink for phosphorus and nitrogen that supported the health of downstream ecosystems in Lake Maurepas (Lane et al. 2003). However, cessation of Mississippi River floods has limited the capacity of these functions and services.

Approximately 44,672 acres, or 24.2 percent, of the study area meet the soil requirements for prime farmland (NRCS 2013). Not all of these soils are presently utilized for agricultural purposes. In addition, these acres and percentage differ from agricultural land use acres and percentage described in Table 2-10, which indicates only 543 acres are in agriculture. This apparent discrepancy is because Table 2-10 was developed for land loss comparisons in the LCA (2004) study. Nevertheless, this is the only readily available land use information for the area. As such the analysis does not include land uses in over 40 percent of the study area, as indicated in Table 2-10. Unique farmland is not located in the study area. Prime farmland is limited to natural ridge tops and consists of the following soil associations: Cancienne silt loam, Cancienne silty clay loam, Carville silt loam, Gramercy silty clay, Schriever clay, and Vacherie very fine sandy loam. Not all of prime farmlands in the study area are used for agriculture. Crops include mainly common bermudagrass, improved bermudagrass, soybeans, wheat, sugar cane, bahiagrass, and corn. Hydrologic conditions and regulations may prevent some of these areas from functioning to prime capacity. Coordination with the Natural Resources Conservation Service regarding prime farmlands has been completed (Appendix A).

The Bonnet Carré Spillway has been used as a Government Furnished borrow source since 1985. The area has been disturbed by sand haulers maintaining the Spillway, and borrow pits are scattered throughout the area. Use of the Bonnet Carré potential borrow site is documented in the 2007 "Final Phase I Environmental Site Assessment, Bonnet Carré Borrow Area, North of Airline Highway, St. Charles Parish, Louisiana."

Soils in the nonstructural plan project area consist primarily of Cancienne (CmA and CnA), Gramercy (GrA), and Schriever (SkA) types. These types are classified as prime farmlands. The only identified water bottom in the nonstructural project areas is Sportsman Pond (17.2 acres) at the northwest corner of Polder 1 (Gramercy Berm).

Future Without-Project Conditions (No Action Alternative)
Direct and Indirect Impacts: There would be no direct impacts. Existing conditions and trajectories of change to area water bottoms, soils and prime and unique farmlands would persist. The area and the known proposed borrow site would continue to experience changes in RSLR that could potentially affect the spatial limits, depths and frequency of inundation to existing wet (hydric) and non-wet (non-hydric) soils in low lying areas. Existing non-hydric soils could be converted to hydric type soils, and existing hydric soils could become permanent water bottoms as swamp habitats are converted to open water. Portions of the area and the Maurepas Swamp could be permanently inundated under both the intermediate and high RSLR scenarios (Table 2-2). Prime farmlands could be converted to other uses.

Under both the intermediate and high RSLR scenarios (Table 2-2), soils would likely remain nutrient poor, exhibit atypically low bulk densities for forested wetlands due to insufficient sediment content, and exhibit a corresponding loss in soil bearing capacity. There would be continued degradation and conversion of forested wetland and swamp habitats to marsh and open water. Saltwater intrusion from Lakes Maurepas and Pontchartrain during storms would continue. Degradation and conversion of existing swamp habitats (hydric soils) to water bottoms would likely continue resulting in less accretion and continued subsidence. Decomposition of swamp vegetation would initially increase the availability of nutrients and detritus. However, the continued conversion of fresh swamp to marsh and eventually to shallow open water would ultimately decrease available nutrients and detritus for the Maurepas Swamp system.

2.4.2 Vegetation Resources

Historic and Existing Conditions
The area includes forested wetlands, swamps, estuarine emergent wetlands, and submerged aquatic vegetation (SAV). Land cover and habitat analysis is displayed in Figure 2-10. These quantities are based upon the USGS land loss data analysis from the LCA Study (2004) and do not represent land cover or habitats for the entire study area. Hence, the 543 acres (0.29 percent) of agricultural/pasture grassland is not representative of the entire study area. Wetlands in the area provide protection from wave action, erosion, and storm damage and offer various consumptive and non-consumptive recreational opportunities.

Vast virgin stands of bald cypress-tupelo swamp habitat once stretched from the bottomlands of north Louisiana to the Gulf of Mexico (Conner and Day 1976). The Maurepas Swamp was vegetated by an expanse of old growth, freshwater forested swamp that extended as far as 26 miles north from the Mississippi River to the Baton Rouge-Denham Springs fault line. The area was subjected to extensive logging through the 1930s. Remnant logging railroad embankments and canal systems used to extract the harvested timber has resulted in increased land loss. Consequently, existing forested wetlands and swamp habitats in the area are rapidly converting to fresh marsh and shallow open water habitats due to impounding, saltwater intrusion, and a lack of nutrient and sediment inputs. This habitat shift has caused a significant loss of wetland functions, including loss of forested wetlands/swamp habitats for wildlife and aquatic species, recreational opportunities, aesthetics, and storm surge protection. To address these forested wetland losses the CBRD and the Maurepas Swamp diversion studies were authorized for study or construction. The State of Louisiana has made restoration of the most severely degraded portions of the swamp a priority by including it in their master plan.

Forested wetlands/swamp and BLH typical dominant and co-dominant species include bald cypress, water tupelo, green ash, swamp red maple, blackgum, diamond oak, black willow, southern wax myrtle buttonbush and Chinese tallow. BLH species in the project area include: swamp red maple, green ash, swamp tupelo, and various oak species. Swamp red maple and green ash typically comprise the sub-dominant mid-story (Beyer et al. 1906, Conner and Day 1976). Scrub species, including black willow, wax myrtle, and buttonbush are sporadically present in areas with diminished canopy cover. Detailed descriptions of common area plants are presented in LCA (USACE 2004, 2010a and 2010b).

SAV communities were historically dominated by native species such as fanwort, coontail, small pondweed, bladderwort, water nymph, widgeon grass, and wild celery. Native communities are largely confined to areas of higher flows, including natural waterways and natural cuts into the swamp interior. Shallow water habitats with insufficient flow may be choked with floating vegetation, greatly limiting light penetration into the water column. SAV are an important food source and habitat for both aquatic organisms and terrestrial wildlife. SAV provides structure and habitat for many invertebrates that are food for various life stages of fish. SAV also provides food for waterfowl and feeding habitat for fish-eating birds such as herons and egrets.

Invasive plants include water hyacinth, alligatorweed, hydrilla, common salvinia, giant salvinia, Chinese tallow, and Chinese privet. These invasive species compete with native flora for resources such as nutrients and light, community structure and composition, and ecosystem processes. Water hyacinth, common salvinia, giant salvinia, and hydrilla all limit the amount of light penetrating the water column. This impacts plankton biomass production. Alligatorweed, Chinese tallow and Chinese privet are of minimal wildlife value and can proliferate until nearly monocultural stands exist, limiting food available for wildlife.

The Louisiana Natural Heritage Program database identifies the following state-listed threatened and endangered species and rare, unique or imperiled vegetative communities in the area: cypress-tupelo swamp rare or unique habitats, swamp milkweed, floating antler fern and rooted spike-rush (LDWF 2013).

The vegetation resource of the nonstructural project area is characterized primarily as grassy vegetated back yards of property and residential landowners or agricultural fields bordering swamp habitat. There are also some areas of BLH and swamp.

Future Without-Project Conditions (No Action Alternative)

Direct and Indirect Impacts: There would be no direct impacts. Existing conditions and trajectories of ecological change to area vegetation would persist. Undeveloped vegetated lands, including wetlands, would continue to be lost to development. Wetlands along major highways would continue to be lost to development as seen along Belle Terre Boulevard in Laplace, and areas north of US-61. Forested wetlands/swamp, BLH and associated sub-canopy species would continue to be subjected to saltwater intrusion and subsidence. Forested wetlands/swamps would continue to convert to marsh and open water (USACE 2010a and 2010b).

Much of the area, as well as portions of the Maurepas Swamp could be permanently inundated under the intermediate and high RSLR scenarios likely further changing existing habitats. The area would continue to be subjected to increases in RSLR which could increase the geographic extent of saltwater intrusion, potentially convert vast areas of existing forested wetlands and swamp habitats to marsh and eventually open water. There could also be a shift from fresh water dominant species to species that can tolerate higher salinity.

Degradation and loss of forested wetland and swamp habitats will accelerate the decline in interdependent processes of plant production and habitats used by various biota necessary for a stable ecosystem. The moderation of storm surge provided by cypress-tupelo swamp and the contribution of vertical accretion to offset subsidence would be lost.

2.4.3 Wildlife Resources

Historic and Existing Conditions: The status, functions of interest, trends, and projections from 1985 through 2050 for the Pontchartrain basin fish and wildlife can be found in Appendix C Section 7 of *Coast 2050: Toward a Sustainable Coastal Louisiana* (http://www.coast2050.gov/reports/app_c.pdf).

Birds: Area wetlands have historically supported an abundance of neotropical and other migratory and non-migratory birds. Diving ducks, seabirds, rails, coots, and gallinules have preferred the open water habitats of Lake Maurepas and the West Manchac Land Bridge, while wading birds typically utilize fresh swamp habitats in the area. The area also supports the bald eagle and colonial nesting waterbird (e.g., herons, egrets, ibis, night-herons, and roseate spoonbills) rookeries. The bald eagle was delisted (2007) as a federally threatened and endangered species for most of the United States; however, it is protected under the Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act. Habitats suitable for use by the bald eagle are present in St. Charles, St. John the Baptist and St. James Parishes, and occurrences of the bald eagle have been recorded there. The bald eagle is known to nest and forage in the Maurepas WMA (personal communication, Ms. Brigette Firmin, USFWS on May 10, 2013). According to USFWS maps depicting active and inactive eagle nests, all active nests are beyond 1,500 feet from the proposed project construction sites. The USFWS considers this sufficient distance not to be of concern for potential impacts by construction activities. The area is also known to support colonial nesting waterbirds (e.g., herons, egrets, and others). The U.S. Fish and Wildlife Service (USFWS) (personal communication, USFWS January 9, 2009) provided recommendations for minimizing disturbance to colonies containing nesting wading birds during construction. The USFWS recommended that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and to avoid affecting them during the breeding season. The recommendations will be followed to the maximum extent practicable. Since 1985, most bird species and species groups in the area have exhibited either increasing or stable populations in the area.

Area forested wetlands, swamp, bottomland hardwood (BLH), and other wetlands provide birds and wildlife with shelter, nesting, feeding, roosting, cover, nursery, and other life requirements. Wetlands provide neotropical migrants with essential stopover habitat on annual migrations (Stouffer and Zoller 2004, Zoller 2004). The greatest threat is habitat loss (American Bird Conservancy 2009). Bottomland hardwood forests provide critical bird breeding habitat (Wekeley and Roberts 1996).

Mammals: Since 1985, furbearer populations have typically remained stable across the Upper Pontchartrain Basin (LCWCRTF & WCRA 1999). Rabbits have experienced declines in the Amite/Blind and West Manchac Land Bridge mapping units, as have squirrels in the West Manchac Land Bridge mapping unit. However, squirrels have remained steady throughout the remainder of the area, whereas deer populations have increased. The West Indian manatee, federally-listed as an endangered species, is known to occur or occasionally enter the area.

Reptiles: Due to the ecological and economic importance of the American alligator, historical and current figures on population numbers are available. In contrast, data on other reptiles in the area is unavailable. LDWF survey data from 1996 to 2000 shows alligator nest densities in the area are classified as medium (approximately 1 nest per 250 acres). Alligator spotlight surveys in the Maurepas Swamp from June to August 2006 found that alligator density, and especially the density of large alligators, appeared to increase with proximity to Lake Maurepas (Fox et al. 2007). There are at least four lizard species, 16 snake species, and 9 turtle species documented in bald cypress-tupelo swamps of southern Louisiana (Dundee and Rossman 1989). The lack of recorded evidence obscures accurate historic and existing conditions for other reptile species that are known or are likely to have inhabited the Maurepas Swamp.

Amphibians: The bald cypress-tupelo ecosystem supports a wide variety of frogs, toads, and salamanders. Abundant water, shelter, and food resources enable several species to thrive. At least 13 frog and toad species and six salamander species inhabit this community type in south Louisiana. Amphibians are often exceptional indicators of wetland ecosystem health. Limited information exists on historic and existing population trends

of area amphibians. In a study on similar habitat located in close to the area, Tinkle (1954) observed numerous amphibian species over the course of a year. Literature accounts and museum specimens suggest the presence of pig frogs (Dundee and Rossman 1989) in Ascension and St. James parishes.

Invasive Wildlife Species: Prior to the introduction of nutria to Louisiana in 1930s (USGS 2000, Baroch et al. 2002), no invasive wildlife species were known to be present. A substantial population increase of nutria is attributed to the decline in the price of pelts in 1989 (USGS 2000, Baroch et al. 2002). Areas of extensive nutria damage, or "eat outs," alter the composition and habitat type of wetland communities (USGS, 2000). Aerial surveys estimated 80,000 acres of marsh in the State of Louisiana were damaged by nutria (Keddy et al. 2007). Throughout the Maurepas Swamp, nutria eat seedling cypress and other forested wetland and swamp tree species preventing regeneration (USACE 2010a).

The Louisiana Natural Heritage Program database identifies the following state-listed threatened and endangered species, the bald eagle, alligator snapping turtles, osprey, and manatee, (LDWF 2013).

Future Without-Project Conditions (No Action Alternative)
Direct and Indirect Impacts: There would be no direct impacts. Existing conditions and trajectories of ecological change to wildlife in the area would persist. Continued human encroachment and development would result in loss of existing wildlife wetland habitats. The area would be subjected to increases in RSLR which could increase saltwater intrusion and exacerbate ongoing conversion of existing forested wetland and swamp habitats to marsh and open water (USACE 2010a, USACE 2010b). The area and the Maurepas Swamp could be inundated to some unknown extent, under both the intermediate and high RSLR scenarios, thereby potentially reducing available forested wetland and swamp wildlife habitat. Migratory neotropic avian species currently utilize the area as stopover habitat. As forested wetlands and swamp habitats are lost, there would be a corresponding reduction in overall species diversity and abundance. Most mammal, amphibian and reptile species would be required to relocate to more suitable swamp habitats. There could be an increase in the population and distribution of nutria due to the conversion of swamp into open water and marsh which are the preferred habitats by nutria.

2.4.4 Aquatic and Fisheries Resources

Historic and Existing Conditions: Plankton and benthic organisms serve as the lowest food resource level for many species of fish and shellfish. Plankton can often indicate benthic, nutrient, and water quality health (Stone et al. 1980). Like plankton, benthic invertebrate communities are good indicators of ecological health. Because many benthic organisms are sessile or have limited mobility, they cannot move away from environmental stressors. Therefore community profiles reveal information about environmental health (Porrier et al. 2009). There is little data available on Lake Maurepas and the upstream Maurepas Swamp plankton communities. Data for Lake Maurepas suggests the dominance of Anabena, dinoflagellates, diatoms, and cyanobacteria with occasional strong presence of chlorophytes (Atilla et al. 2007).

Benthic macroinvertebrates tend to dominate deepwater swamp invertebrate communities. Characteristic species include crayfish, clams, oligochaete worms, snails, freshwater shrimp, midges, amphipods, and various immature insects (Mitsch and Gosselink 1993). One of the main functions of a benthic community is secondary production, the conversion of plant material by benthic detritivores and herbivores to animal tissue, thereby forming major links in the aquatic food web between plants and predators. Compared to other habitat types, bald cypress-tupelo wetlands may support higher invertebrate densities.

Limited data exists on area benthic communities. Species present are likely typical of deepwater forested wetlands and slow-flowing rivers in the region. However, the increased duration of inundation and the low flow and exchange due to impoundment have promoted a system characterized by low DO levels and limited drawdown of water levels to below surface elevations. These conditions likely have resulted in reduced diversity of benthic organisms. Species composition has likely shifted towards species more tolerant of low DO levels, such as oligochaetes and midges. Reduced soil bulk densities and changes in average particle size,

texture, and organic content due to low sediment input may further influence habitat suitability and species presence (Day et al. 1989). Within Blind River, woody debris introduced from the adjacent swamp may provide suitable substrate for invertebrates to colonize and thus support benthic community diversity.

The Maurepas Swamp benthic community is seasonally abundant. Typically, winter months have higher DO concentrations when water temperatures are cooler. Organisms found in winter include a variety of segmented and flatworms, snails, crustaceans, and insects. During summer, when lower DO is present, the benthic community is sparse. Air-breathing insects and crustaceans; a few tubificid oligochaetes and dipterans, which can tolerate lower oxygen conditions; and crawfish, especially burrowing crawfish, may be found. During periods when the swamp floor dries, these organisms survive through the resistance stages (eggs, cocoons, etc.) and repopulate the area when water returns to the swamp (Loden 1978).

Salinity strongly influences species composition of invertebrate communities. Higher abundance of benthic organisms has been associated with decreasing salinity from saline to freshwater sites in Louisiana (Philomena 1983). Invertebrate species vary in the range of salinity within which they can survive and their tolerance to fluxes (Day et al. 1989). The Maurepas Swamp, Blind River, and the bayous and canals in the area are primarily freshwater, but salinity intrusion can occur. Throughout the area higher salinity occurs during drought years (Shaffer et al. 2003). The relatively low salinity of these waters provides transitional habitat for freshwater fish and provides nursery and foraging habitat for marine fish and shellfish. Freshwater fish, such as largemouth bass, sunfish, catfish, and crappie are taken by recreational fishermen (LDWF 2009, Hastings 2001). Crawfish and crabs may be harvested from the swamp (Fox et al. 2007).

A survey from January 1976 to August 1977, (Watson et al. 1981) sampled fish species at six locations along Blind River from south of US-61 to Lake Maurepas. The 57 species of finfish collected included 12 estuarine, 43 freshwater, one catadromous and one anadramous species. Freshwater species were dominant both spatially and temporally. Finfish diversity appeared to be higher at the lower stretches of Blind River, below the Amite River Diversion Canal and closer to Lake Maurepas. Multiple studies have been conducted on diversion projects in the area. Data from these studies show an overall decrease in the number of taxa collected. However, different sampling gear and sample locations could explain the trends. Additionally, an overall a trend toward less freshwater species collected is evident (Fox et al. 2007).

Fox et al. (2007) sampled fish at 20 locations in the Maurepas Swamp. There were 26 taxa collected with a total of 1,425 individuals. Spotted gar and striped mullet were dominant species making up 76.5 percent of all fish. Physiochemical data was collected as well, study (Fox et al. 2007) ranged from 1.52 to 6.25, and species richness ranged from 2 to 12 species, indicating a very variable community. Lower diversity, evenness and richness were observed in the interior, in areas of low flow, low DO and low pH. Most of the species specific analyses were consistent with known habitat preferences. For example, spotted gar was negatively correlated with high surface DO levels. This species can breathe air, and it is usually found in hypoxic areas.

The areas available for aquatic and fisheries resources in the nonstructural project area are limited to the small drainage canals that transect the area. These canals have limited tidal influence and are dominated by fresh water species such as sunfish, bowfin, catfish, and crawfish when flooded.

The Louisiana Natural Heritage Program database identifies the following state-listed threatened and endangered species: paddlefish and manatee (LDWF 2013).

Future Without-Project Conditions (No Action Alternative)

Direct and Indirect Impacts: There would be no direct impacts. Existing conditions and trajectories of ecological change to aquatic and fisheries resources would persist. The area would be subjected to increases in RSLR which could increase saltwater intrusion and lead to increases in and the potential conversion of vast areas of forested wetlands and swamp habitats to marsh and open water. Much of the area, as well as the Maurepas Swamp could be permanently inundated under both the intermediate and high RSLR scenarios. There could

be a shift from fresh water dominate species to those species that can tolerate higher salinity.

2.4.5 Essential Fish Habitat (EFH)

Historic and Existing Conditions: Table 2-14 and Figure 2-9 show two EFH species and their likely occurrence in the area by life stage. Blind River and various bayous and canals in the Maurepas Swamp provide EFH, including nursery, foraging, and spawning and breeding grounds. Aquatic and wetland habitats in the area include estuarine emergent wetlands, submerged aquatic vegetation, mud substrates, and estuarine water column. These provide EFH for white shrimp and red drum. Waterbodies and wetlands provide nursery and foraging habitats for a variety of fish, some of which may serve as prey for other fish species designated as EFH species (e.g., mackerel, snapper, and grouper) and highly migratory fishes (e.g., billfish and sharks). The area also provides foraging and nursery habitat for economically important marine fishery resources including striped mullet, Atlantic croaker, blue crab, and Gulf menhaden. The area is important for Federal and state-managed species. It provides foraging and nursery areas for prey species (gulf menhaden and bay anchovy) (Penland et al. 2002) eaten by predators, such as sand seatrout, spotted seatrout, catfish and crappie (LDWF 2009, Hastings 2001), and highly migratory species.

Table 2-14: Essential Fish Habitat for life stages of species in Lake Pontchartrain.

Species	Life Stage (occurrence in project area)	Essential Fish Habitat Zone and Habitat Type
White Shrimp (*Litopenaeus setiferus*)	Adult (rare)	Near shore and offshore sand/shell, and soft bottoms.
	Juvenile (common to abundant)	Estuarine emergent marshes and soft bottoms.
Red Drum (*Sciaenops ocellatus*)	Adult (common to rare)	Estuarine SAV, soft bottoms, sand/shell and emergent marshes. Near shore pelagic and sand/shell, and hard bottom habitat (used for spawning. Offshore sand/shell and hard bottom).
	Juvenile (common to rare)	Estuarine SAV, soft bottoms and near shore sand/shell, and hard bottom.

(GMFMC 2004, NMFS 2013b, USACE 2008, NMFS 2009)

Future Without-Project Conditions (No Action Alternative)

Direct and Indirect Impacts: There would be no direct impacts. Existing conditions and trajectories of change to essential fish habitat would persist. The area and Maurepas Swamp could be inundated to some unknown extent, under the intermediate and high RSLR scenarios, thereby potentially increasing the extent of saltwater intrusion that could potentially convert existing EFH nursery swamp habitats to marsh and open water EFH.

2.4.6 Threatened and Endangered Species

Historic and Existing Conditions

A complete list of threatened and endangered species and critical habitats in the project area is presented in USACE (2010a) and (USACE 2010b). Two threatened and endangered species, the Gulf sturgeon (*Acipenser oxyrhynchus desotoi*) and the West Indian manatee (*Trichechus manatus*), and one delisted species, the bald eagle (*Haliaeetus leucocephalus*), are known to occur or occasionally enter the area. There are no threatened or endangered plants in the area.

West Indian Manatee: Substantial food sources (submerged or floating aquatic vegetation) have not been observed in the area. Given the extensive areas of relatively undisturbed wetlands in the region and the paucity of food sources in the project area, it is considered unlikely for the manatee to frequent and utilize the inshore waters of Lake Maurepas and Pontchartrain as habitat, although manatees could pass through this area while transiting the lake.

Gulf Sturgeon: The area is not Gulf sturgeon critical habitat.

There are no threatened or endangered species known to occur within the nonstructural project areas. The delisted Bald eagle and colonial nesting waterbirds could potentially utilize the areas. However, it is unlikely that they would nest in these areas since these features are along the interface of urban land and forested wetlands.

Future Without-Project Conditions (No Action Alternative)
Direct and Indirect Impacts: There would be no direct impacts on threatened or endangered species, or their designated critical habitats, bald eagles or colonial nesting waterbirds. The Gulf sturgeon and the West Indian manatee, along with the bald eagle, would continue to occasionally enter the project area. The West Indian Manatee has been infrequently sighted near the project area. Continued conversion of forested wetlands and swamp habitat to marsh and open water would provide more favorable conditions for the Gulf Sturgeon and the West Indian Manatee, but would provide only foraging habit for the bald eagle and colonial nesting waterbirds. As forested wetlands and swamp habitats are lost, there would be a corresponding reduction in overall species diversity and abundance.

2.4.7 Cultural and Historic Resources

Historic and Existing Conditions**:** Eight cultural units are used to characterize the prehistoric cultural sequence in southeast Louisiana: Paleo-Indian (10000–8000 B.C.), Archaic (8000–1000 B.C.), Poverty Point (1700–500 B.C.), Tchefuncte (500 B.C.–A.D. 100), Marksville (A.D. 100–500), Baytown (A.D. 400–700), Coles Creek (A.D. 700–1200) and Mississippian/Plaquemine (A.D. 1200–1700). Historic perspectives generally cover the colonial period to approximately 1764, Acadian migration to the area, end of the Colonial period, the Antebellum period, the Civil War, late 19th century reconstruction, and the early 20th century.

Not all project areas have been adequately examined for cultural resources, especially along natural waterways. The area contains natural levee of the Mississippi River, where numerous historic cultural resources, such as plantation buildings, have been recorded. Although cultural resources surveys have crossed many portions of the project area, undiscovered cultural resources may still exist.

Plantation properties that overlap the area include 16AN31 (Monroe Plantation), 16SJB8 (Belle Point Plantation), 16SJB10 (Laplace Plantation), 16SJB12 (Sunnyside Plantation), 16SJ11 (Hester Plantation), 16SJ12 (St. Elmo Plantation), 16SJ20 (Wilton Plantation), 16SJ21 (Helvetia Plantation), 16SJ30 (Colomb Plantation), 16SJ34 (St. Rose Plantation), 16SJ49 (Rapidan Plantation), 16SJ37 (Welham Plantation). These often contain outbuildings or components to a plantation operation, and may cover several acres.

Less definable cultural resources within lands protected by the artificial Mississippi River Levee include 16SC54, 16SC79, 16SJB8, 16SJB66, 16SJ19, 16SJ29, 16SJ64. The site identified as 16SJ1 is a National Register of Historic Places (NRHP) prehistoric site located in agricultural lands, and 16SJ50 and 16SJ51 are additional prehistoric sites that may be contemporaneous and related to site 16SJ1. Further sites include 16SJ5, 16SJ7, 16SJ9, 16SJ15, 16SJ16, 16SJ18, and 16SJ57 that have been determined as ineligible for the NRHP.

Cultural sites on the Mississippi River batture includes 16SJ13, 16SJ31, 16SJ39, and sites 16SJ41 – 16SJ48 that are ineligible for the NRHP. Site 16SJ38 has remnants of the Bourbon Plantation sugar house. Cultural resources in the Maurepas Swamp include parts of rail lines and water crossings used for logging (16SJ71, 16SJ72, 16SJ73). Other recorded resources includes two historic coffins (16SJ58, 16SJ61) eroded from a cemetery probably associated with 19th-20th century Blind River hunting camps. Recorded resources along the shores of Lake Maurepas, Lake Pontchartrain, or waterways include 16SJB4, 16SJB33, NRHP site 16SJB2, the Schloesser Cemetery (16SJB3), and remnant civil war fortifications (16SJB7).

Future Without-Project Conditions (No Action Alternative)
Direct and Indirect Impacts: No direct impacts to cultural and historic resources would occur. Indirect impacts

would be the continuation of existing conditions. Changes in RSLR could affect the spatial limits, depths and frequency of inundation to existing cultural and historic resources.

2.4.8 Aesthetics and Visual Resources

Historic and Existing Conditions**:** Aerial photography between 1992 and 2010 shows visual conditions of the area changed over 20 years. The landscape along with view sheds has changed due to development, the conversion of swamps into marsh and open water. Photographs show that the same public thoroughfares that are in place today were in place in 1992; however, the scenery has changed from natural to a more developed state with residential, commercial and industrial development dominating US-61, US-51 and US-44, and other corridors. The only major exception is I-10, which traverses the area, giving near unobstructed views of a native landscape that remains aesthetically pleasing. Primary view sheds then, as they are today, were best taken from the local road system, and, in some instances, the Mississippi River levee.

There are two Scenic Streams in or near the area. Blind River stretches south 25 miles from Lake Maurepas, crossing under I-10 and ending near US-61 on the west side of the area. Bayous LaBranche and Trepagnier are located to the east outside of the study area sourcing from Lake Pontchartrain and stretching south, crossing under I-10 and US-61 and ending near the Norco (Bayou Tepagnier) and Good Hope (Bayou LaBranche). Other water resources include the Mississippi River, and numerous canals, streams and creeks that crisscross the native habitat between I-10 and the developed areas along the river (LDWF 2013).

> *"Blind River's surrounding habitat is composed almost entirely of deep, wooded swamp with Spanish moss draped bald cypress and water tupelo being the dominant plant species. The habitat exhibits moderate plant species diversity and moderately high animal diversity. Natural levees and spoil banks provide the only upland habitat available near the river."*

Scenic Byways include the Great River Road traversing US-61. This is but one segment to an overall scenic byway that stretches on multiple thoroughfares from Canada to the Gulf of Mexico. It is state and federally designated and has an "All American Road" status, making it significant in culture, history, recreation, archeology, aesthetics and tourism.

Future Without-Project Conditions (No Action Alternative)

Direct and Indirect Impacts: There would be limited to no direct impacts to visual resources. Visual resources would most likely evolve from existing conditions in a natural process, or change as dictated by future land use maintenance practices and policies.

2.4.9 Recreation Resources

Historic and Existing Conditions

The area includes the 103,263-acre Maurepas Swamp WMA. There are a few private camps in the WMA. The Louisiana Department of Wildlife and Fisheries (LDWF) estimates that there were 22,673 WMA recreation users in 2012. Access into the WMA area is generally by boat; however, several locations provide foot access. Consumptive recreation includes hunting deer, squirrels, rabbits and raccoons; fishing for bass, sunfish and crappie; and trapping alligators and nutria. Non-consumptive recreation includes bird watching, sightseeing, and boating. There is a 0.5 mile nature trail and two tent-only camping areas.

Many canals and bayous traverse the area, including Pipeline, Hope, Grand Point, and Reserve Relief Canals; and Mississippi and Manchac Bayous. Blind River is one of the most used waterways in the WMA. Recreation includes boating, fishing, hunting, and crawfishing. There is a public boat launch (Hope Canal) in the WMA. There are boat launches near the WMA boundary providing access into the WMA, including Tchakenhou Bayou, Ruddock Canal, Reserve Relief, and St. James Boat Club launch. Additionally, the St. James Boat Club boat launch, funded by the Land and Water Conservation Fund, provides access to Blind River. It includes playground facilities and is used as the Choupique Rodeo Site. Three launches access the I-55 canal. There are no designated parking lots; parking occurs along the highway. The canal provides access to Lake Maurepas. A launch is located at the end of Peavine Road to access Lake Pontchartrain. Three launches are located off US-

61, I-55, and I-10. The US-61 launch provides access to Conway Canal and Old New River. The I-55 and I-10 boat launches provide access to adjacent canals and Lake Maurepas.

Cajun Pride Swamp Tours is located off Frenier Road near US-51. This commercial operation provides boat tours in their private refuge and in the Manchac Swamp. Belle Terre Country Club and Golf Course is located in the area. This provides various recreational facilities including a golf course, outdoor swimming pool, and tennis courts. There are local recreational parks including Regala Park, Montz Park, Bethune Park, and Laplace Recreation and Youth Organization (Larayo) Youth Park. Regala Park facilities include an outdoor swimming pool, softball/baseball fields, picnic pavilions, tennis courts, playground, racquetball courts, 1 mile walking path, and soccer field. Montz Park provides a 1,561-foot walking path, baseball fields, basketball courts, playground, and picnic pavilions. Bethune Park provides baseball fields and as does Larayo Youth Park which also provides tennis courts and a swimming pool.

The Grand Point boat launch is north of Polder 3. Sportsman Pond is a private reservoir north of Polder 1 and is not available for public use.

Future Without-Project Conditions (No Action Alternative)
Direct and Indirect Impacts: There would be no direct impacts. Recreational infrastructure would remain vulnerable to surges. Parks, boat launches, and golf courses could be damaged. Storm surge and salt water could have a negative impact on freshwater forests and habitats and could reduce recreational resources (e.g., fishing, hunting, bird watching, and other).

2.4.10 Noise

Historic and Existing Conditions**:** There are many different noise sources throughout the area including commercial and recreational boats, and other recreational vehicles; automobiles and trucks, and all terrain vehicles; aircraft; machinery and motors; and industry-related noise. There are noise ordinances in St. Charles and St. John the Baptist Parishes. St. James Parish does not have any specific ordinances regarding construction noise. The maximum permissible sound levels for St. John the Baptist Parish during the hours of 7:00 am to 10:00 pm are 70 dBA for residential areas and 75 dBA for business and commercial areas (St. John the Baptist Sound Levels). The maximum permissible sound levels for St. Charles Parish during the hours of 7:00 am to 10:00 pm are 60 dBA for residential areas and 65 dBA for commercial areas (St. Charles Sound Levels).

A number of parks and the WMA are located adjacent to or near the nonstructural project areas. These public lands are sensitive noise receptors where serenity and quiet are an important public resource. The areas with the greatest number of sensitive noise receptors, such as residential homes and apartments, schools, churches, and parks are also located in St. James Parish. They are located along Hwy 3125 for the nonstructural system. In addition, neighborhood communities in which the nonstructural system polders such as Gramercy (Polder 1), Grand Point South (Polder 2) and Grand Point North (Polder 3) contain a large number of residential sensitive noise receptors in St. James Parish.

Background Noise
Noise levels surrounding the St. Charles, St. James, St. John the Baptist Parishes are variable depending on the time of day and climatic conditions. Near developed areas, automobile and train traffic, and to a lesser extent air traffic, contribute to the background noise levels.

Sensitive Noise Receptors
A number of parks, WMAs, and wildlife refuges are located adjacent to or near the project area. These public lands are sensitive noise receptors where serenity and quiet are an important public resource. The areas with the greatest number of sensitive noise receptors, such as residential homes and apartments, schools, churches, and parks, are located in St. James and St. John the Baptist parishes. They are located adjacent to the I-10 and I-55 highway system and along Highway (Hwy) 3125. In addition, rural neighborhood communities such

as Gramercy and Grand Point contain a large number of residential sensitive noise receptors in St. James parish.

2.5 Cumulative Impacts for the Future Without Project Condition

Cumulative impacts would be the incremental direct and indirect impacts of not implementing a storm risk reduction system for each of the significant resources described above in addition to the direct and indirect impacts attributable to other storm damage risk reduction systems which have not and would not be implemented in the Pontchartrain Basin, Louisiana and the nation. There is little, if any, published data with which to provide a quantitative comparison regarding proposed hurricane/tropical storm damage risk reduction projects which have not been implemented. Primary cumulative impacts would include the incremental effects of not providing hurricane/tropical storm damage risk reduction. These would be localized and would affect different parts of the area and, as discussed in more detail above, would include impacts on:

- an estimated 62,900 residents and 20,000 residential structures in the area;
- an estimated 70,190 non-farm jobs; 1,900 non-residential structures; 23,800 farm acres;
- a projected 165 public and quasi-public facilities;
- transportation infrastructure;
- community and regional growth;
- tax revenues and property values;
- community cohesion, especially during hurricane and storm surge events;
- potential degradation and or loss of cultural and historic resources;
- the continued loss of wetland habitats due to human development and conversion of existing forested wetlands and swamp habitats to marsh and open water; and
- potential salt water intrusion and inundation during hurricane and storm surge events.

3.0 PLAN FORMULATION

Plan formulation supports the USACE water resources development mission. A systematic and repeatable planning approach is used to ensure that sound decisions are made. The Principles and Guidelines describe the process for Federal water resource studies. It requires formulating alternative plans that contribute to Federal objectives. Sections 3.1 through 3.8 describe the plan formulation process used to identify the tentatively selected plan (TSP) identified in the Draft Report which was released to the public in August 2013. Section 3.9 describes additional planning efforts that followed, which took into account comments received on the Draft Report as well as additional engineering and environmental investigations performed to achieve feasibility level of design. These additional planning efforts allowed the team to modify and further refine features identified in the TSP. See chapter 5 for complete details of the finalized plan and recommendations.

3.1 Prior Studies

Problems and opportunities are documented in prior reports. Table 3-1 lists relevant studies.

Table 3-1: Relevant prior reports and studies.		Relevance to WSLP Study				
Comprehensive Planning Studies		Data Source	Consistency	Structural Measures	Nonstructural Measures	FWOP Conditions
1980	LA Coastal Resources Program	X	X	X	X	X
1999	Coast 2050: Toward a Sustainable Coastal LA	X	X	X	X	X
2004	LA Coastal Area (LCA), LA Ecosystem Restoration Study	X	X	X	X	X
2012	LA's Comprehensive Master Plan for a Sustainable Coast	X	X	X	X	X
Related Hurricane and Flood Damage Risk Reduction Projects and Reports						
1927	"Flood Control, Mississippi River and Tributaries" Published as House Document 90, 70th Congress 1st Session	X	X	X	X	X
1965	Chief of Engineers Report on Lake Pontchartrain and Vicinity, LA Hurricane Protection Project	X	X	X		X
1967	Amite River and Tributaries, Comite River Basin, LA	X	X	X		X
1984	Chief of Engineers Report on Lake Pontchartrain and Vicinity, LA Hurricane Protection Project	X	X	X		X
1990	LA Coastal Area Mississippi River Delta Study	X	X	X		X
1994	LA Coastal Wetlands Restoration Plan	X	X	X	X	X
1994	Southeast LA Hurricane Preparedness Study	X	X	X	X	X
2010	LCA Ecosystem Restoration Study, Volume II of VI, Final Integrated Feasibility Study and Supplemental Environmental Impact Statement for the Amite River Diversion Canal Modification Ascension and Livingston Parishes, LA	X	X	X	X	X
2010	LCA Ecosystem Restoration Study, Volume IV of VI , Final Integrated Feasibility Study & Supplemental Environmental Impact Statement for the Small Diversion at Convent/Blind River St. James Parish, LA	X	X	X	X	X
Previous West Shore Lake Pontchartrain Reports						
1985	West Shore Lake Pontchartrain Initial Evaluation Report	X	X	X		X
1987	Lake Pontchartrain West Shore, LA Hurricane Protection Reconnaissance	X	X	X		X
1997	West Shore Lake Pontchartrain, LA Hurricane Protection Project, Reconnaissance	X	X	X		X
2003	St. John the Baptist Parish, LA East Bank Urban Flood Control Reconnaissance Report	X	X	X		X

3.2 Planning Constraints

Plans are formulated to achieve objectives. **Objectives** and **constraints** are linked to problems and opportunities. Constraints are restrictions that limit the extent of the planning process.

Planning Constraints

1. Minimize impacts to wetlands.
2. Minimize impacts to the Small Diversion at Convent/Blind River project and River Reintroduction into Maurepas Swamp project.
3. No loss of flood protection from existing flood damage reduction projects.
4. Minimize impacts to the Maurepas Swamp Wildlife Management Area and surrounding wetlands.
5. Minimize infrastructure impacts (pipelines, highways, hospitals, schools, fire and police stations).

3.3 Management Measures Considered and Screened (*NEPA required)

A **management measure** is a feature or an activity that can be implemented at a specific geographic site to address one or more planning objectives. They can be used individually or combined with other management measures to form alternative plans. Measures were developed to address problems and to capitalize upon opportunities. They were derived from a variety of sources including prior studies, the public scoping process, and the team. This study considered structural measures and nonstructural measures to provide risk reduction and maximize project benefits. All measures were screened for capability to meet objectives and avoid constraints, for engineering and economic feasibility, and for the level of risk reduction provided over the period of analysis (2020 to 2070). Measures that warranted continued consideration were assembled into **alternative plans**. Below are the structural and nonstructural measures that were considered. Those measures carried forward for further consideration are shown in blue boxes. Figure 3-1 illustrates some of these measures. Detailed information about the measures and screening process can be found in Appendix E.

Nonstructural Measures

- **Full Acquisition/Buy-out**: Relocate residents outside of the flood plain by physically moving structures or by purchasing replacement structures. An acquisition program would reduce flood vulnerability and decrease future flood damages. *Carried forward for further consideration.*
- **Limited Acquisition/Buy-out**: Remove structures that receive repetitive damages from high frequency storm events (1 year, 5 year, 10 year, and 25 year frequencies). *Carried forward for further consideration.*
- **Flood proofing and Elevation**: Raise residential structures above the 2070 flood plain and flood proof other structures, such as public facilities, to reduce damages. *Carried forward for further consideration.*
- **Floodplain Management Measure**: Update local flood plain zoning rules based on changes due to RSLR. *Carried forward for further consideration.*
- **Cypress Reforestation**: Enhance and/or restore forest on the Maurepas Landbridge and in the Maurepas Swamp to reduce surge heights. *Eliminated from consideration because it would be ineffective in reducing the level of risk reduction.*
- **Flood Forecast and Warning Measures**: Develop more robust flood forecasting and warning systems. *Eliminated from consideration because the area has an ample forecast/warning system provided by local government. National Oceanic and Atmospheric Administration (NOAA), FEMA, and the USACE already take the responsibility of producing storm surge maps under existing flood plain management authorization.*

Structural Measures

- **Levees/Floodwall**: Block storm surges. *Carried forward for further consideration.*
- **Control Structures on Canals and Bayous**: Place control structures on canals and bayous to reduce the risk of flood damages. *Carried forward for further consideration.*
- **Seawall**: Construct a seawall along the rim of Lakes Maurepas and Pontchartrain. *Eliminated because it would have adverse environmental impacts by enclosing swamp, and would stop drainage systems by preventing water exchange with Lake Maurepas. Mitigation features for this measure would not be cost effective.*
- **Floodgates on Tidal Passes**: Place a large tide control structure on Pass Manchac, and potentially North Pass, to prevent storm surge from entering the area. *Eliminated from consideration because it would have adverse impacts on the environment and drainage systems by restricting tides and limiting the ability of the upper basin to drain during storms. The mitigation features would be cost prohibitive. Additionally, it would be ineffective due to surge flanking.*
- **Highway/Levee**: Raise I-10 to serve as a levee to reduce risk of surge damage. *Eliminated from consideration because it would require massive changes to the highway system, and would require replacement of the highway during scheduled levee lifts.*

3.4 Initial Array of Alternatives (*NEPA required)

Structural Measures (levee and floodwalls) were combined into an **initial array of 12 alternative plans**. Plans start in the eastern study area, and incrementally expanded west.

- **Plan 1**: Bonnet Carré Spillway to Reserve Canal.
- **Plan 2**: Bonnet Carré Spillway to East St. John High School (ESJHS).
- **Plan 3**: Bonnet Carré Spillway to ESJHS along the wetland/non-wetland interface.
- **Plan 4**: Bonnet Carré Spillway to ESJHS offset from I-10.
- **Plan 5**: Bonnet Carré Spillway to Marathon.
- **Plan 6**: Bonnet Carré Spillway to Reserve enclosing US-51.
- **Plan 7**: Bonnet Carré Spillway to Marathon following the wetland/non-wetland interface.
- **Plan 8**: Bonnet Carré Spillway to Ascension Parish/Mississippi River.
- **Plan 9**: Bonnet Carré Spillway to Hope Canal/Mississippi River.
- **Plan 10**: Bonnet Carré Spillway to the Hope Canal/Mississippi River enclosing I-10.
- **Plan 11**: Bonnet Carré Spillway to the Hope Canal/Mississippi River avoiding pipelines.
- **Plan 12**: Bonnet Carré Spillway to Ascension Parish enclosing I-10.

To determine the plans to evaluate further, each plan was scored from 5 (high performing) to 1 (low performing) based on how well it met objectives and avoided constraints (see Table 3-2). The scores were totaled and the plans were compared, evaluated and screened. Scores for meeting the objectives and avoiding constraints were developed by reviewing existing available data sources and newly modeled storm surge impacts. For example, data sources such as existing habitat maps were used to determine which plans impacted the least amount of wetlands. Plans were displayed in a geographical information system (GIS) and plans that affected lower acres of wetlands were given a higher score for avoiding wetlands. Other data sources such as the local infrastructure (e.g. pipelines, major highways, drainage features) were also used to score the plans. Plans that crossed these features typically add additional costs and failure risks to a system. Plans that avoid major infrastructure were given higher scores. Storm surge modeling was also developed to investigate the impacts to the landscape and structures. For example, the future equivalent annual damages by reach, inundation maps, and the number of structures included in the risk reduction system were all used to evaluate the ability of a plan to reduce hurricane storm surge related damages through 2070. The storm surge data was also used to make assumptions on the potential impacts related to induced-stages outside of a plan's risk reduction system. Maps and detailed descriptions of the scoring for each of the alternatives can be found in Appendix E.

Table 3-2: Screening and ranking initial array plans against objectives and constraints

	Objectives Ranked* (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)			Avoids Constraint (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)					
Condensed Plan ID	#1 Storm damages	#2 Reduce risk to life and health	#5 Reduce the risk of damage and loss of critical infrastructure	#1 Min. impacts to wetlands	#2 Min. impacts to diversion projects	#3 No loss of existing flood protection	#4 Avoid impacts to WMA & wetlands	#5 Min. impacts to critical infrastructure	SUM
Plan 11: Spillway to Hope Canal/MS River (Pipeline Avoidance)	4	4	4	3	3	3	3	5	29
Plan 9: Spillway to Hope Canal/MS River	4	4	4	5	4	1	5	1	28
Plan 10: Spillway to Hope Canal/MS River (I-10 Protection)	4	4	4	2	3	3	2	5	27
Plan 12: Spillway to Ascension Parish (I-10 Protection)	5	4	5	1	1	4	1	4	25
Plan 8: Spillway to Ascension Parish/MS River	5	4	5	1	1	4	1	4	25
Plan 3: Spillway to ESJ (wetland/non-wetland)	2	1	3	5	4	1	5	2	23
Plan 2: Spillway to East St. John High School (ESJ)	2	1	3	4	4	2	4	2	22
Plan 7: Spillway to Marathon (wetland/non-wetland)	2	2	3	4	4	1	4	1	21
Plan 4: Spillway to ESJ (I-10 Offset)	2	1	3	2	4	2	4	3	21
Plan 5: Spillway to Marathon	3	2	3	2	4	1	4	1	20
Plan 1: Spillway to Reserve Canal	2	1	3	2	4	2	4	2	20
Plan 6: Spillway to Reserve (US-51 Protection)	2	1	2	4	4	1	4	1	19

*Objectives 3 and 4 were not used. These are planning objectives that would be met with the transmittal of the final report.

Plans 1-6 were eliminated from further consideration because they did not maximize the planning objectives. (See Table 3-2, objectives ranked column.)

Plan 7 and Plan 9 alignments follow the wetland/non-wetland interface through St. John the Baptist Parish. However, Plan 7 would not provide risk reduction to the town of Garyville. By increasing the length of the levee by 500 feet, Plan 9 provided risk reduction to Garyville while only minimally increasing costs. Plan 7 was thus eliminated. Plan 8 and Plan 12 would provide risk reduction to the same area. The difference between the two Plans is the tie-in points at the two closest high ground areas to prevent storm surge from flanking the levee. Plan 12 would extend into Ascension Parish and tie into the Marvin Braud pump station. Plan 8 would tie into Hwy-70 in St. James Parish adding 4 miles to the alignment. Plan 12 was carried forward instead of Plan 8 because it was less costly and the direct environmental impacts were less than Plan 8.

The four remaining structural plans were carried forward: Plan 9, Plan 10, Plan 11 and Plan 12.

Nonstructural measures were also considered. A stand-alone nonstructural plan would require acquisition or elevation of 14,486 structures in the flood plain and would cost $3,260,000,000, far exceeding estimated benefits and costs of other plans. The stand-alone nonstructural plan was eliminated from evaluation, but

other nonstructural measures were carried forward to complement structural alignments. After screening the structural plans, the remaining plans (Plan 9, Plan 10, Plan 11 and Plan 12) were evaluated to identify if there was a risk of storm surge related damage not completely addressed by the structural alignments. While Plan 12 would provide risk reduction to most of the developed study area, Plans 9, 10, and 11 would not provide risk reduction to St. James Parish.

Nonstructural measures were added to complement Plans 9, 10, and 11 due to the risk of potential storm surge damages to areas west of Hope Canal. With nonstructural measures, Plans 9, 10, and 11 would provide benefits commensurate with Plan 12 (Figure 3-2).

The number of structures expected to be impacted by storm surge is highly influenced by RSLR. Under the base condition, (year 2020) damages in St. James Parish resulting from a 1% probability hurricane/tropical storm event would impact approximately 219 structures. As discussed in Chapter 2 and presented in the Economic Appendix, there are a limited number of existing damages in the western portion of the study area, in St. James Parish (Figure 3-3). Less than 10% of the total $190 million EAD without project damage occurs in this area, but the damages are expected to increase with the effects of RSLR over time. By the end of the 50-year period of analysis, approximately 1,571 structures out of 4,921 structures in St. James Parish would be affected by a 1% probability hurricane/tropical storm event. Due to the uncertain impacts of RSLR, a range of costs were developed based on a minimum expected number of structures based on the 2020 flood plain and a maximum number of structures based on the 2070 flood plain. These costs were used in the economic evaluation for determining the average annual cost for each plan.

Four plans, three of which contained nonstructural measures, were carried forward and identified as follows:

Plan 9 + nonstructural → **Alternative A**
Plan 10 + nonstructural → **Alternative B**
Plan 11+ nonstructural → **Alternative C**
Plan 12 → **Alternative D**

These alternatives were further evaluated considering alignments with respect to the I-10 corridor. Alternative B would not provide greater risk reduction for I-10 than any other plans. Alternative B would reduce risk to the same number of structures as Alternative C but would enclose about 4,000 more acres of wetlands. For these reasons, alternative B was eliminated.

3.5 Final Array of Alternatives (*NEPA required)

The final array of alternatives carried forward for consideration included **the No Action Alternative**, **Alternative A**, **Alternative C**, and **Alternative D** (Figure 3-4). For Engineering details, see Appendix B. Table 3-3 shows comparative details. For screening to determine the TSP, the team assumed that Alternatives A, C, and D would provide equal levels of risk reduction. With the inclusion of the nonstructural measures for Alternatives A and C, the alternatives would provide risk reduction to the same group of structures behind Alternative D. Using this assumption the least costly plan would have the highest net benefits. The analysis was based on a 1% probability hurricane/tropical storm event.

No Action Alternative (Future without-project condition)

Under the No Action Alternative no risk reduction would occur. The area would continue to experience storm surge damages. This would be exacerbated by RSLR and increased impacts to wetlands due to salinity. As wetlands erode and subside, they would provide less risk reduction.

Table 3-3: Comparative details for final array of alternative plans.

Plan	Length of Alternative	Size of Study Area Behind Alternative	Number of Structures Behind Alternative	Communities Behind Alternative	Miles of I-10 Behind Alternative	Wetlands Behind Alternative	Number of Pipeline Crossings
A	20 miles	38 sq miles	16,919	Montz, Laplace, Reserve, Garyville	4 miles	~5 sq miles	70
C	18 miles	47 sq miles	16,919	Montz, Laplace, Reserve, Garyville	4 miles	~16 sq miles	36
D	28 miles	160 sq miles	21,840	Montz, Laplace, Reserve, Garyville, Lutcher, Gramercy, Grandpoint	15 miles	~79 sq miles	14

Alternative A: Bonnet Carré Spillway to the Hope Canal to Mississippi River

Alternative A (Figure 3-5) would provide risk reduction to St. Charles, St. John the Baptist and St. James Parishes. The approximately 20.41-mile levee and floodwall alignment begins at the West Guide levee of the Bonnet Carré Spillway, north of transmission line and pipeline corridors and extends west around the I-10/I-55 interstate interchange and along the wetland/non-wetland interface. The alignment turns south near Hope Canal, until it reaches the Mississippi River Levee (MRL). The plan included in the final array included nonstructural measures to acquire or elevate 1,571 structures outside of the levee alignment to reduce the risk of storm surge-related damages in the areas west of Hope Canal. The plan would not reduce risk to infrastructure in St. James Parish.

Construction of this plan would require roughly 3,100,000 cubic yards of earthen borrow material; 3,700,000 square yards of geotextile fabric; 30,000 cubic yards of aggregate limestone road; nearly 5,000 feet of T-walls to cross under the interstate, or as frontal risk reduction for pump stations; 1,200 feet of flood gates; 240 feet of drainage gates; and 2 railroad gates. Eight pump stations on the alignment would require 25,000 cubic yards of concrete, 230,000 square feet of sheet pile, nearly 7,000 tons of riprap, and 151,000 linear feet of concrete piles. Multiple flap gate culverts would be built. Because the alternative hugs the wetland/non-wetland interface, Alternative A has the least adverse indirect wetland impacts. However, the plan has the greatest residual risk (the risks left after all construction and safety measures have been assessed) because overtopping of the levee by surge would immediately inundate populated areas. It also has the most pump stations which would result in more maintenance and greater system failure risks. It is the least adaptable because expansion of the levee could require the purchase and/or relocation of existing structures.

Alternative C: Bonnet Carré Spillway to the Hope Canal to Mississippi River

Alternative C (Figure 3-6) would avoid multiple pipeline and utility crossings. It follows the Alternative A alignment between the West Guide levee of the Bonnet Carré Spillway to the US-51 interchange, where it then tracks north across US-51 and along a pipeline corridor. The approximately 18.27-mile alignment crosses I-10 and follows the pipeline corridor through wetlands near the Belle Terre exit until it reaches Hope Canal. The alignment then turns south and extends to the MRL. The plan included in the final array, included nonstructural measures to acquire or elevate 1,571 structures outside of the levee alignment to reduce the risk of storm surge-related damages in the areas west of Hope Canal. The plan would not have reduced risk to infrastructure in St. James Parish.

Construction of this plan would require about the same amount of borrow material as Alternative A. It would require 3,365,000 square yards of geotextile fabric; 26,000 cubic yards aggregate limestone road; 5,300 linear

feet of T-walls; 300 linear feet of flood gates; 200 linear feet of drainage gates; 4 pump stations; and 2 railroad gates. Environmental structures similar to those for Alternative A would be built. This alternative encloses more wetlands than Alternative A, therefore would require more environmental structures to maintain existing hydrology. Alternative C has less residual risk because levee overtopping would not immediately inundate communities. Because the alignment does not abut existing structures, Alternative C is more adaptable should changing conditions result in future authorizations that require structure modifications.

Alternative D: Bonnet Carré Spillway to Ascension Parish

Alternative D (Figure 3-7) is a westward extension of Alternative C along the I-10 corridor into Ascension Parish. It continues west at the St. James Parish line slightly north of I-10 until it reaches the Old New River, where it proceeds north to the non-Federal Laurel Ridge levee in Ascension Parish. Measures to maintain water flow and to reduce impacts to wetlands would be built. Alternative D reduces risk to communities in St. Charles, St. John and St. James Parishes and provides a level of risk reduction to a segment of the I-10 hurricane evacuation route.

Construction of the approximately 28-mile alternative would require 3,700,000 cubic yards of borrow material, 3,037,000 square yards of geotextile fabric; approximately 37,000 cubic yards of aggregate limestone road; just over 4,000 linear feet of T-walls; 300 feet of flood gates; 400 feet of drainage gates; approximately 6 pump stations; nearly 24,000 cubic yards of concrete; almost 200,000 square feet of sheet pile; approximately 5,900 tons of rip rap; 154,000 linear feet of concrete piles; and environmental structures, most notably at Blind River, a State designated Louisiana Scenic River. It encloses the most acres of wetlands requiring more environmental structures than any of the other alternatives. Similar to concerns expressed in connection with Alternative C, there is concern about potential impounding of large areas of wetlands under this alternative, especially if the river diversion projects are constructed. Alternative D would reduce risks to roads and other infrastructure in St. James Parish.

3.6 Cost Estimates

Estimated costs for levees, floodwalls, and pump stations; real estate costs; OMRR&R; environmental mitigation; and nonstructural features included in Alternatives A and C (which at that time in the planning process included acquiring or elevating 1,500+ structures) were totaled for alternatives and compared to help identify a TSP. Because costs for the nonstructural features of Alternative A and C, and costs associated with mitigation for indirect impacts were uncertain at that time, a cost range was developed for each feature.

Nonstructural Cost: A 100% structure survey of area improvements was available. The cost of raising and/or acquiring structures located in the 2020 and 2070 100-year flood plains was evaluated by comparing the cost of elevating the structure to the cost of acquiring the structure. The lesser cost was used to determine the nonstructural feature cost. RSLR greatly impacts the number of structures to be raised, resulting in uncertainty as to how many structures would have to be raised by any given date. A minimum cost of the nonstructural feature of $53,143,789 was developed based on the cost of reducing risk to structures in the 2020 100-year flood plain. A maximum cost of $305,256,794 was developed based on the cost of reducing risk to structures in the 2070 100-year flood plain. The maximum cost was used for comparison. (Later, during the feasibility level of design phase, a detailed investigation of this component was conducted to determine which increment of the nonstructural cost would be justified and to identify other effective and less costly opportunities to provide storm surge risk reduction in St. James Parish.)

Indirect Impact Cost: At this stage, mitigation costs for indirect impacts remained uncertain due to limited hydrologic information and lack of a full wetland value assessment (WVA). To reduce the uncertainty of costs associated with mitigating for indirect impacts, a maximum cost based on Morganza to the Gulf and Lake Pontchartrain and Vicinity project estimates, and a minimum cost based on local mitigation bank costs were developed. These costs were averaged. In place of WVA analysis, habitat reduction values from 5 - 75 percent were calculated. Using these values, the average estimated mitigation cost associated with indirect impacts

ranged from $871,000,000 to $980,000,000 for Alternative A, $844,000,000 to $1,000,000,000 for Alternative C, and $672,000,000 to $2,200,000,000 for Alternative D.

The habitat reduction value impacts were estimated to be approximately 15 percent of the total enclosed wetlands, as shown in Table 3-4. Because risk reduction features were designed to maintain existing hydrologic flows to the extent practicable, indirect impacts are expected to be limited to those that occur during closure of structures for storm surge events, an estimated 8.5 days per year. (A WVA analysis based on hydrologic modeling was later conducted on the TSP during feasibility design.)

Table 3-4: Estimated first costs for final array of alternative plans used to select the TSP.

	Alternative A	Alternative C	Alternative D
Levees & Floodwalls	$335,898,670	$334,156,997	$339,508,346
Pump Stations	$132,162,500	$112,687,500	$166,437,500
Pipeline Relocations*	$70,300,000	$35,100,000	$11,693,750
Real Estate	$3,849,000	$3,283,000	$2,434,000
Direct Habitat Impacts	$17,000,791	$35,710,811	$43,323,364
Indirect Mitigation Cost (15%)	$23,123,679	$54,655,968	$327,687,626
Nonstructural 2070**	$305,256,794	$305,256,794	$0
Total Cost	**$887,591,434**	**$880,851,070**	**$891,084,586**

***Pipeline Relocation cost are part of the NFS' LERRD Responsibility; these cost are borne 100% by the NFS. **Some nonstructural costs are NFS LERRD costs. The nonstructural costs have been spread over the entire period of analysis and have been heavily discounted. They result in less than 17% of the total average annual costs.**

OMRR&R Cost: Table 3-5 provides preliminary OMRR&R cost estimates for each alternative (used to select the TSP).

Table 3-5: Comparison of annual OMRR&R cost for final array of alternative plans used to select a TSP.

Alternative	Levee Grass Cutting		Structure OMRR&R ($)	Total OMRR&R ($)
	(acres)	($)		
Alternative A	390	$234,000	$7,277,050	$7,511,050
Alternative C	868	$520,800	$3,607,275	$4,128,075
Alternative D	1269	$761,400	$5,421,538	$6,182,938

NOTE: Based on levee right-of-way acres, 2012 dollars, and includes a 25% contingency. OMRR&R costs for mitigation are not included. Cost include grass cutting; pump station and flood gate replacement; and other planned OMRR&R activities.

3.7 Summary of Accounts and Comparison of Alternatives

Plans in the final array were assumed to provide equal levels of risk reduction. To facilitate evaluation and comparison of the alternatives, four Federal Accounts were used to assess the effects of alternatives. The accounts are National Economic Development (NED), Environmental Quality (EQ), Other Social Effects (OSE), and Regional Economic Development (RED).

No Action Alternative: No NED benefits would be associated with the No Action Alternative. There would continue to be adverse impacts to the EQ as salinity levels increase in the area, affecting wetlands and eventually causing impacts to residents (OSE) in the immediate vicinity of the study by reducing the natural swamp buffer. Reducing the natural buffer could also cause uncertainty to RED by impacting major oil refineries in the region and the overall economy.

Alternative A: Alternative A provides NED benefits, but less net benefits than Alternative C. It encloses the fewest wetlands, resulting in the least adverse impacts to EQ. However, it risks immediate inundation of communities in an overtopping event; thus reducing safety to residents (OSE) in the area. It limits future modification or system reinforcement due to its proximity to structures. It would risk disruptions to the local

drainage patterns if design parameters are exceeded (Figure 3-8). While Alternatives C and D would disrupt existing drainage if design parameters are exceeded, the damage resulting would be greatest for Alternative A due to the close proximity of the levee to existing structures. There is no risk reduction to roads in St. James Parish which could flood, preventing employees from accessing vital industries.

Alternative C: Alternative C maximizes benefits. It has more adverse impacts on EQ than Alternative A but reduces impacts to wetlands compared to Alternative D. In case of a major storm surge event that exceeds the federally authorized project design, Alternative C could reduce the risk to OSE because storm surge would, over time, first fill in the wetlands before potentially inundating developed areas. Also because this alternative is set back from existing structures the alignment can be enlarged should RSLR be greater than anticipated without displacing area residents. There would have been no risk reduction to roads in St. James Parish as originally formulated prior to selection of the TSP. (The final recommended plan for St. James Parish would provide some measure of risk reduction to those roads located within the berms.)

Alternative D: Alternative D provides NED benefits, but does not maximize those benefits. It provides risk reduction to a larger area thus reducing risk to more area residents. Structural risk reduction is provided to roads in St. James Parish, reducing the risk that employees would be unable to access critical infrastructure and places of employment. Additionally, because the levee is not located in close proximity to existing structures, the threat of flooding due to exceedance of design parameters is lessened. Alternative D poses potential uncertainties concerning the impoundment of large areas of wetlands, especially if the river diversion projects are constructed. While it would prevent saltwater intrusion, it would risk impacting hydrology by enclosing approximately 54,800 acres of swamp and would impact the EQ of the Maurepas WMA as well as Blind River, a Louisiana Scenic River.

Economic Costs Comparison: The parametric implementation costs were annualized using the current interest rate (3.75%) at the time of the Draft Report and a 50 year period of analysis (2020-2070). In 2020, only 5% of the benefits would have been derived from St. James Parish and only 219 structures would have been located within the 100-year flood plain. During the study period prior to the selection of the TSP, it was determined that the cost of the nonstructural features for Alternatives A and C would have increased from approximately $53,000,000 (in year 1) to over $305,000,000 (in year 50) due to RSLR. Most of the structures would not have resided in the 100-year flood plain until late in the period of analysis. Because of this, the nonstructural costs for features proposed prior to the determination of the tentatively selected plan were spread evenly over a 53-year period beginning in 2017 and ending in 2069; and then compounded or discounted to the 2020 base year. The annual benefits were compared to the cost assuming a 100-year level of risk reduction. The total annual benefits were then compared to the total annual costs. Table 3-6 provides an overview of the Total NED Project Costs (Gross Investment) and annual cost between each alternative. Gross investment cost includes interest cost (+/-) for construction and OMRR&R. There is an $83 million differential gross investment cost between Alternatives C and A, and a $220 million differential gross investment cost between Alternatives C and D.

Table 3-6: Economic comparison of final array of alternative plans that were used to select a TSP.

	Total NED Project Cost (Gross Investment in Millions)	Annual Costs ($ millions)
Alternative A	$909.4	$40.5
Alternative C	$826.7	$36.8
Alternative D	$1,047.2	$46.7

As discussed in Section 3.5, the team assumed that Alternatives A, C, and D would provide equal levels of risk reduction with the inclusion of the nonstructural features associated with Alternatives C and A. The least costly plan would have the highest net benefits. The preliminary benefit to cost ratio (BCR) for Alternative C

equaled 1.63 to 1 with annualized net benefits of approximately $23,000,000. For Alternative A the BCR equaled 1.48 and for Alternative D, 1.28 with net benefits of $19,400,000 and $13,200,000, respectively.

Table 3-7: Economic comparison of final array of alternative plans used to select a TSP.

Alternative	First Costs ($ millions)	Annual OMRR&R ($ millions)	Equivalent Annual Benefits ($ millions)	Annual Costs ($ millions)	Benefit-to-Cost Ratio	Annualized Net Benefits ($ millions)
A	887.6	7.5	59.9	40.5	1.48	19.4
C	881.0	4.1	59.9	36.8	1.63	23.0
D	891.1	6.2	59.9	46.7	1.28	13.2

Benefits such as reductions in emergency costs and damage to roadways were not calculated. These benefits, if calculated, would have been expected to be greatest for Alternative D and the least for Alternative A, but these benefits are usually minimal and would not impact the selection of the TSP.

Alternative A tracks the wetland/non-wetland interface in Laplace to its termination at the Hope Canal in western St. John the Baptist Parish. It requires the largest number of pump stations (8 pump stations) compared to Alternative C (4 pump stations) and would require approximately $7,500,000 in OMRR&R costs to maintain the fully constructed alternative compared to $4,100,000 in OMRR&R for Alternative C.

3.8 Identifying the Tentatively Selected Plan

Alternative C was identified as the TSP and the NED plan as determined by the evaluation criteria. It fulfills the planning objectives in Section 1.5. It reasonably maximizes net benefits, consistent with protecting the nation's environment in accordance with national environmental statutes, applicable Executive Orders, and other Federal planning requirements.

3.9 Additional Plan Formulation

After the release of the Draft Report, the team conducted additional engineering and environmental investigations. Items investigated included the optimization of storm surge risk reduction measures in St. James Parish, the development of a detailed mitigation plan, and the development of a detailed cross-section of the levee system. Information gathered through these additional investigations in conjunction with consideration of concerns raised by the public and by agencies assisted the team in further refining the design of the TSP. The subsections below provide a summary of how the team conducted these investigations and addressed public and agency concerns.

3.9.1 Optimization of Storm Surge Risk Reduction Measures in St. James Parish

To address public and agency concerns the team further optimized the component of TSP in St. James Parish. The Draft Report presented a nonstructural raising or a buyout program in St. James Parish. The original nonstructural assumption for the cost and benefit analysis in the Draft Report was based on 100% public participation rate and included removing or modifying over 1,500 structures. Based on public comments, this type of program would likely receive very little public participation if the program were voluntary due to the number of structures potentially removed from the community. As stated in Section 3.6, the team evaluated the incremental justification of the nonstructural component presented in the Draft Report. In reviewing the nonstructural plan alone, it was determined that the BCR was less than 1 for the nonstructural increment as it was proposed in the TSP described in the Draft Report. In subsequent discussions with the local stakeholders and experts in the field of storm surge risk reduction measures, the study team determined that lower cost, localized storm surge risk reduction measures could be implemented to achieve similar levels of storm surge risk reduction presented in the Draft Report. This, in turn, would raise the BCR above unity for this increment of the TSP.

After reviewing the limits of storm surge flooding and St. James Parish flooding characteristics, the team determined that different combinations of localized storm surge risk reduction measures could be used to increase the anticipated rate of public participation. These combinations could also decrease the cost to be included as justified project increments. In early screening efforts, the team had already reviewed large ring levees or extending a large levee system around all of the structures in St. James Parish and had determined that the equivalent annual damages would not economically support a large levee system. This plan was not revisited for this effort.

In order to focus on economically justified and environmentally compliant increments the team focused on measures that reduced the existing risk of storm surge damage without significantly altering the nature or extent of flooding in the area. The characteristics of storm surge flooding in the western portion of the study area (St. James Parish) are significantly different from what is seen in the eastern portion of the study area. In the developed areas of St. James Parish, storm surge flooding is less than 3 ft deep on average and the area is in an interior (low velocity) area of the coastal flood plain. In some areas, flooding only occurs because storm surges travel upstream via drainage pipes under a highway (Hwy 3125). Using this information, the USACE reviewed the use of berms and flap gate closures along Hwy 3125 to address a large portion of the existing flooding in St. James Parish. The flap gate closures are similar to one-way check valves that prevent storm surge from traveling upstream through drainage features. Because the study area is a very large, flat coastal flood plain, there is a very low risk that berms or flap gate closures would significantly alter the nature or extent of flooding. In addition, these features would have minimal environmental impacts due to the small footprint of the features, which would in turn lead to lower cost for implementing the measures. The area enclosed by the localized storm surge risk reduction measures s account for less than 2% of the total study area.

Appendix E provides the details of the plan formation process, but during the final feasibility phase of the study, the USACE shifted its primary focus away from the Draft Report's plan for complete structure elevations and buyouts. This shift to other localized storm surge risk reductions measures mainly focused on the closures and flapgates on Hwy 3125 and a proposal to construct three berms around a small group (polder) of structures in the Grand Point and Gramercy/Lutcher areas (Figure 3-9). Additional individual flood proofing measures for 23 individual structures were also included to address any remaining frequent surge-related flood risk that might exist outside of the berms and flap gates. Buyouts for these structures were not used because flood proofing measures for these structures could be implemented at a much lower cost, approximately $18.5 million for buyouts vs. $6.7 million for flood proofing.

The initially optimized increment of the TSP contained five major components:

- **Polder 1 (Gramercy Berm)** a berm around a small group of structures in the Gramercy/Lutcher area north of Hwy 3125.
- **Polder 2 (Grand Point South)** a berm around a small group of structures in the Grand Point area north of Hwy 3125 near Longview Park. (Grand Point North).
- **Polder 3 (Grand Point North**) a l berm around a small group of structures in the Grand Point area north of Hwy 3125, near the Grand Point Boat Launch (Grand Point South).
- **Flap Gates and Closures on drains under Hwy 3125** to reduce risk to structures south of the highway.
- **Flood proof structures north of Hwy 3125** in St. James Parish which are located outside of the berms with a first floor below a 2020 1% probability hurricane/tropical storm event.

Table 3-8. shows the economic evaluation of each separable localized storm surge risk reduction element.

Table 3-8. Economic evaluation of potential localized storm surge risk reduction components

Localized Storm Surge Risk Reduction Component	Equiv Annual Benefits 2014 Prices and 3.5% Discount Rate (2020-2070) ($1,000)	Total Annual Costs 2014 Prices and 3.5% Discount Rate (2020-2070) ($1,000)	BCR Ratio
Polder 1 (Gramercy Berm)	$1,073	$842	1.27
Polder 2 (Grand Point South)	$229	$1,057	0.22
Polder 3 (Grand Point North)	$956	$839	1.14
Flap Gates and Closures on drains under Hwy 3125	$1,119	$464	2.41
Flood proof structures north of Hwy 3125	$2,290	$299	7.67

A review of each component determined that every component considered, except for Polder 2 (Grand Point South), was economically justified on its own. The USACE's ER 1105-2-100 states that separable elements have to be incrementally justified to be included in the final recommendation. Polder 2 (Grand Point South) BCR's ratio was less than unity when evaluated separately. At this point, Polder 2 (Grand Point South) was removed from the overall localized storm surge risk reduction system associated with the final TSP.

The TSP was then changed to include the Alternative C levee alignment and four justified localized storm surge risk reduction components:

- **Alternative C Levee Alignment**
- **Polder 1 (Gramercy Berm)**
- **Polder 3 (Grand Point North**)
- **Flap Gates and Closures on drains under Hwy 3125**
- **Flood proof structures north of Hwy 3125**.

Details associated with Polder 2 (Grand Point South) that were developed prior to the removal of the polder from the overall localized storm surge risk reduction components are still included in Chapter 4 and related appendices. This information is presented to allow for other state and local stakeholder to address storm surge flooding concerns not fully addressed by the recommended plan. Under the no action scenario, the area would still experience an estimated $905,000 in total equivalent annual hurricane/tropical storm surge damages.

Inclusion of the optimized and justified components would not have changed the TSP selection presented in the Draft Report. Alternative A as presented in the Draft Report included the same initial nonstructural components as Alternative C. Alternative C still would have lowest cost and the highest net benefits compared to Alternatives A or D.

Including the optimized and justified component in the final design would reduce storm surge damages in St. James to the 2020 100 yr level of storm surge initially. Chapter 5.1 outlines the features and specifications of the localized storm surge risk reduction measures. The NFS will be required to maintain the two berms in the localized storm surge risk reduction features to their initial design height for so long as the project remains authorized. Even with this requirement, the effectiveness of these components in the future would depend on the actual rate of RSLR. The NFS is not obligated to address this loss of risk reduction through future berm lifts or highway lifts, but they will still be required to repair, rehabilitate or provide replacement of components associated with the construction of berms and flap gates to maintain the original project benefits. As stated above, the initial screening efforts indicated that the equivalent annual damages in the St.

James Parish would not economically support berms with future lifts similar to a levee system where future levee lifts are included to maintain an initial level of risk reduction. The NFS will also not be obligated to OMRR&R the flood proofing measures that constitute elevation of individual residential structures or construction of small ring berms around individual non-residential or light industry/warehouse structures.

3.9.2 Development of a detailed mitigation plan

The objective of the mitigation plan is to restore swamp and BLH to compensate for unavoidable project-induced impacts. WVA models were run on the feasibility design of the TSP to determine the functions and values of the impacted habitats, expressed in AAHU. The models predict that approximately 1,189 AAHU would be lost due to direct and indirect habitat impacts over the 50-year period of analysis. Of the total 1,189 AAHU, impacts to swamp habitat would account for approximately 1,089 AAHU and impacts to BLH would account for the remaining 99 AAHU.

By drawing from many existing reports for restoration actions in nearby swamps, the team was able to assemble a mitigation plan to compensate for project-related direct and indirect impacts to swamp and BLH. The plan complies with the requirements of the Water Resources Development Acts of 1986 and 2007, USACE regulations, and mitigation standards. Details of the mitigation features are included in Chapter 4 and in the Environmental Appendix.

The Swamp WVA model predicts that Alternative C's indirect impacts to enclosed forested wetlands will require mitigation for 494.5 AAHUs. Alternative C has been designed in a manner to eliminate hydraulic impacts to the enclosed swamp and this design has been verified with the 1D HEC-RAS hydraulic modeling (See Engineering Appendix, Interior H&H). The design of the levee system includes both a protected and flood-side ditch as well as six drainage structures to maintain day-to-day tidal changes in the study area. The system will only be closed during hurricane and storm surge events. The drainage structures have been placed along existing canals that currently drain both upland and wetland areas during rainfall events. The majority of gravity drainage is confined to these existing waterways and the expected result of this design would minimize indirect environmental impacts to the enclosed swamps. Although the system has been optimized for hydraulic interchange when the system is not in use, there remain some indirect impacts that are attributable to enclosing swamp. These impacts are based on best professional judgment and experience in the vicinity. The HET assumed that placement of the levee would result in a reduction in efficiency of drainage on the protected side thereby affecting water quality and increasing impoundment. The HET assumed that these impacts may not have been adequately captured in the H&H modeling effort or in its margin of error. Additional investigations will be conducted during the Preconstruction Engineering and Design phase to ensure that the project's design minimizes impacts to both the enclosed swamp and the water levels to the maximum extent practicable.

3.9.3 Development of detailed cross-section of levee system

After the release of the Draft Report, additional hydraulic modeling was conducted on the TSP to determine the final design dimensions. Storm surge modeling was conducted to determine the final levee heights for the design. Under the planning phase, the levee heights were based on a limited number of storm simulations and still water elevations. Additional hydrological modeling was completed to determine the levee systems impacts on rain events and water exchanges. The results of additional modeling efforts led to changes (e.g. inclusion of floodside ditch, protected side canal) in the overall footprint of the levee cross-section. Details of the changes are included in Chapter 5 and in the Engineering Appendix.

3.9.4 Concerns with induced flooding impacts

There is a margin of error in both the economic model and the storm surge modeling (ADCIRC) which is recognized by team hydrologists and economists. In general, the potential impacts to communities outside of the proposed levee alignment would be similar with and without the recommended levee alignment. The ADCIRC modeling will be refined during preconstruction engineering and design to determine whether or not there will be induced flooding and to precisely estimate its magnitude. At feasibility level of design, the

model uncertainty and inclusion of localized storm surge risk measures adequately address the limited potential for induced flooding.

In order to address public and agency concerns related to the potential for induced flooding impacts associated with levee feature proposed, the team conducted additional investigation on the storm surge stages in St. James Parish under the future with project conditions.

A review of the storm surge modeling results (information available in the Engineering Appendix) of the with-project conditions (those conditions with Alternative C in place) found increased stages during a storm event that ranged between 0.1 and 0.2 feet of water. These elevated water stages were observed between the 50-500 year events. No induced flooding was observed in storm surge events between the 1-25 year events.

Nearly 5,000 structures were investigated outside of the proposed levee system for the future without project conditions. Of these 5,000 structures, approximately 1,900 of them are susceptible to surge damages from a 2070 intermediate RSLR 1% probability hurricane/tropical storm event. Introducing a 0.2 foot increase in water surface elevation to the 100 year 2070 intermediate RSLR scenario could result in approximately 50 additional structures being impacted. All of these structures are within the polders (Figure 3-10). The potential inducements due to the maximum 0.2 foot water surface elevation increase could result in approximately $200,000 average annual damages. In contrast, there are nearly $190,000,000 million in average annual damages attributed to storm surge stages in the study area.

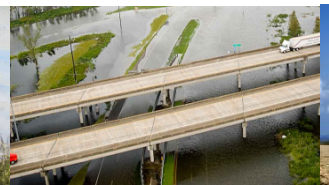
3.9.5 Comparison of Final Feasibility Designed TSP to Estimated Final Feasibility Design for Alternatives A and D

This section compares the final feasibility designed TSP to other alternatives in the final array. This analysis was performed in order to conduct a comparative analysis of the impacts for each of the implementable alternatives (see Chapter 4) and in order to confirm that the final impact analysis and final mitigation requirements would not have changed the TSP identified in the Draft Report. Alternatives A and D were "brought up" to a similar level of detail using assumptions derived from data collected during the final feasibility design of the TSP. Table 3-9 presents, in comparative form, the data developed during feasibility design on the TSP and the estimates that were developed for purposes of this analysis on both Alternatives A and D. Because of the lack of detail as it relates to the required width of the Alternative D levee as it extends to the west, estimates were developed for two variations of Alternative D: Maximum Width (MaxW) and Minimum Width (MinW). Estimates for both variations were developed to confirm that the factor of "levee width" would not have changed the TSP selection.

The only significant change between the TSP and the recommended plan was the optimized localized storm surge risk reduction features in St. James Parish. Both Alternative A and Alternative C under the final array used a minimum cost of a nonstructural feature of $53,143,789 and maximum cost of $305,256,794. The cost for this TSP component has now been reduced to approximately $40M and would be included in Alternative A and C. A detailed re-assessment of the benefit-to-cost ratios in the final alternative array would not provide any additional information sufficient to change the selection of the TSP. This is because Alternative A, as presented in the Draft Report, included the same initial nonstructural components as Alternative C. Alternative C still would have lowest cost and the highest net benefits compared to Alternatives A. In addition to the cost differences, other factors were investigated under the feasibility design to verify the selection of Alternative C as the recommended NED plan. A summary of these factors are discussed in the sections below.

Table 3-9. Additional plan formulation based on environmental factors

	Draft Feasibility Design	Final Feasibility Design	Estimated Final Feasibility Design for Alternatives A and D[1]		
	TSP (Alternative C)[2]	Final Feasibility Designed TSP (Alternative C)	Alternative A	Alternative D	
				(Maximum Width)[3]	(Minimum Width)[3]
Length of levee and flood walls	18.27 miles	18.27 miles	20.41 miles	28 miles	28 miles (9.26 miles along Alternative C)
Tie in Location	Mississippi River Levee	Mississippi River Levee	Mississippi River Levee	Laurel Ridge Levee and Marvin Braud (May need to be longer to tie in to high ground in the future)	Laurel Ridge Levee and Marvin Braud (May need to be longer to tie in to high ground in the future)
Width of levee	387 feet	541 feet	541 feet	541 feet	541 feet for 9.26 miles and 442 feet for 19.74 miles
Localized storm surge risk reduction measures	Flood proofing 1,571 structures outside of the levee alignment by acquiring or elevating structures	Flood proofing through the use of two polders, Flap gates and closures on drains under Hwy. 3125, elevating 14 residential structures and flood proofing 9 commercial and industrial structures.	Same as Recommended plan.	None	None
Total Acres of direct impact[4]	856 acres	1,198 acres	1,338 acres	1,836 acres	1,611 acres
Direct swamp Acres[5,6]	719 acres	1,114 acres	1,398 acres	1,951 acres	1,712 acres
Direct BLH Acres	56 acres	123 acres	123 acres	No Impacts to BLH	No Impacts to BLH
Direct Swamp AAHU[7,8]	N/A	595.6 AAHU	747.9 AAHU	1,032.4 AAHU	905.88 AAHU
Direct BLH AAHU[9]	N/A	95.5 AAHU	95.5 AAHU	0 AAHU	0 AAHU
Swamp enclosed	8,424 acres	8,432 acres	3,564 acres	56,588 acres	56,588 acres
BLH Enclosed	0 acres	89 acres	89 acres	89 acres	89 acres



	Draft Feasibility Design	→	Final Feasibility Design	→	Estimated Final Feasibility Design for Alternatives A and D[1]		
Attribute	TSP (Alternative C)[2]		Final Feasibility Designed TSP (Alternative C)		Alternative A	Alternative D (Maximum Width)[3]	Alternative D (Minimum Width)[3]
Indirect Swamp AAHU[8]	N/A		494.5 AAHU		191.5 AAHU	2,235.8 AAHU	2,235.8 AAHU
Indirect BLH AAHU[9]	N/A		3.1 AAHU		3.1 AAHU	3.1 AAHU	3.1 AAHU
Total AAHU[8] (direct and indirect)	N/A		1,188.7 AAHU		1,038.0 AAHU	3,268.2 AAHU	2,867.69 AAHU
Average Mitigation Cost[10]	$90,400,000		$159,597,672 (Cost of actual Mitigation plan $109,500,000)		$69,400,000	$768,200,000	$674,100,000
Induced flooding potential	Limited		Limited		Limited	Potentially Significant	Potentially Significant

[1] Estimated final feasibility design based on Engineering and WVA calculation developed during based on the Final Feasibility design of the TSP.

[2] Carried over from the TSP analysis.

[3] The Maximum Width is the same levee width used for the final feasibility designed TSP. The Minimum Width uses the width identified for the final feasibility designed TSP for that portion of the levee where Alignment C overlaps with Alignment D and for the remaining 19.74 miles, the original width estimates reported in the Draft Report. .

[4] Acres of direct impact are based on the actual width of the direct impact area and include areas that are both wetland and not wet areas.

[5] Includes one acre of direct impact from a localized storm surge risk reduction measure in both Alternatives C and A.

[6] The WVAs for Alternative C were performed using a wider footprint (560 feet) then the actual (see body of table for levee width) footprint. Because of this, the total acres of wetlands reported may be higher than the total final footprint.

[7] Includes 0.3 AAHU of direct impact from localized storm surge risk reduction measure in both Alternatives C and A.

[8] AAHU estimates developed for both Alternatives A and D are based on assumptions made during the running of the Swamp WVAs for Alterative C. No new data was collected specific to Alternatives A and D. For approximately six miles Alternative A and Alternative C follow the same alignment and thus have the same direct impacts. The remaining portion of Alternative A's alignment was in a sub area of the indirect impacts for Alternative C and is at the most approximately 1.25 miles apart. The indirect impact area for Alternative A is a sub area of Alterative C indirect impact area. Alternative D follows the first 9.26 miles of Alternative C going from east to west thus should have the same direct impact for that length. The further west the alignment goes the less reliable the estimated height will be. Two widths were chosen to estimate for the remaining 19.74 miles (see footnote 3 above). The indirect impact areas for the eastern and central portion of Alternative C are the same for Alternative D. There is a risk that the data for the western portion of Alternative C is not reasonable for the far western portion of Alternative D's indirect impact area.

[9] Both the directly impacted BLH in Alternative A and the indirectly impacted BLH in both Alternatives A and D make up the same area of BLH examined in Alternative C.

[10] Based on Method 1 (see section 3.9.5.1) of cost estimation used in draft report using 34% reduction in HSI rather than 15% reduction in HSI. This Method Does not take into account a wider footprint.

3.9.5.1 Comparison based on Average Annual Habitat Reduction Values

During initial screening of Alternatives A, C and D, habitat reduction value impacts were estimated. A 15% habitat reduction value was based on professional judgment, an understanding of the ecosystem dynamics in the project area and the estimated direct and indirect impact acres for each alternative. A single reduction value for all alternatives was decided upon for initial screen based on preliminary information on the existing habitat, and the opinion of the hydraulic engineer that the indirect impacts would be similar for all alternatives. During feasibility design of the TSP, WVA analysis was conducted using habitat measurements and planning and habitat team assumptions. With this information the team was able to validate assumptions used for the Draft Report.

The following approaches were developed to compare indirect impacts across all alternatives (Alternatives A, C and D) and with the Draft Report methodology:

Method 1: To compare project costs among the final array alternatives, the team determined the percent change in the Alternative C WVA Habitat Suitability Index (HSI) by calculating the change from baseline condition at Target Year (TY) 0, with HSI of 0.76, to future with project conditions at TY 50 with HSI of 0.51, respectively. The future with project condition shows a 34 percent reduction in HSI. This value was then used to develop project cost estimates for each alternative in the final array.

Method 2: This method is explained in detail in Appendix A Annex R page 3 in the section "Early Habitat Assessment applied to Final Array". Method 2 uses two ecological parameters (a floristic quality index (FQI) and hydrologic index (HI)) from the Coastwide Reference Monitoring System (CRMS) (http://www.lacoast.gov/crms2/Home.aspx) sites. These two ecological parameters from the CRMS "Site Level Report Cards" were added together as a HSI equivalent (HSIe). For Alternative A and C, the HSIe was 0.53 and for Alternative D HSIe was 0.47. These HSIe were then used in the WVA model for the FWOP condition at all years. The HSI equivalent was reduced for future with project conditions by 15 percent. These values, along with the number of acres impacted by each alternative were input into the Alternative WVA model to calculate AAHUs. Although this is not a certified method of use of the WVA, it allows comparison of AAHUs indirect impacts across all alternatives without having full field data to perform the WVA.

Method 3: This method assumes the WVA model results used in determining indirect impacts of implementing Alternative C is representative (see footnote 8 of table 3.9) of the areas impacted by Alternative A and Alternative D. Hence, the Alternative C WVA analysis was combined with the respective number of acres impacted by Alternative A and Alternative D to determine these alternatives' respective AAHU. The AAHU for Alternative C were determined by the WVA analysis process utilizing habitat measurements and assumptions of the planning and habitat team. Whereas, for Alternative A and Alternative D, the AAHU are based on habitat analysis from the Alternative C area.

The comparison of alternatives by each method shows some general trends:

Method 1.

Comparison of 34 (Table 3-9) percent and 15 percent habitat impacts shows that the relative costs between Alternatives A and C remain nearly the same (42 percent compared to 43 percent, respectively). (See Table 3-9.) Whereas, Alternative D shows a 10 percent increase in costs relative to Alternatives A and C (Alternative D showed a 53 percent change, Alternative A shows 42 percent change and Alternative C shows a 43 percent change). Alternative A has the least habitat impacts and mitigation costs; Alternative D has the greatest impacts and mitigation costs.

Methods 2 and 3.

Comparing AAHU developed under Methods 2 and 3 shows that for both Alternatives A and D, AAHU were underestimated by relatively the same amount, 11 percent. Whereas, for Alternative C, AAHU were

underestimated by 21 percent. Using Method 3, Alternative D has the greatest impacts to swamp and BLH habitat (approximately 2,079.6 to 1,678.99 AAHUs more than Alternative C). Alternatives A and C are predicted to be roughly comparable in total impacts. The impact to BLH is identical between the two alternatives. Alternative C has fewer direct impacts to swamp by 152.3 AAHUs compared to Alternative A. Alternative C avoids and minimizes direct impacts to a greater extent due to the fact that the levee is a shorter alignment than Alternative A. Alternative C is predicted to have greater indirect impacts to swamp by 303 AAHUs as compared to Alternative A. Overall, Alternative A is predicted to require mitigation for approximately 150.7 AAHUs less than Alternative C. However, these differences in AAHU are not considered significant enough to drive selection of a different plan due to the fact that the projected difference in mitigation costs between Alternative C and Alternative A does not cause Alternative C to no longer be the NED plan.

While Alternative A is predicted to have fewer environmental impacts than Alternative C, Alternative C is the least environmentally damaging practicable alternative. An alternative can only be defined as practicable if it is capable of being implemented. To assess the ability to implement Alternative A we must factor in the lessons learned from the Interagency Performance Evaluation Task Force (IPET) and post event investigations of Hurricane Katrina. After consideration of the forensics of damages from Hurricane Katrina in 2005, Alternative A would not be a practicable alternative. The IPET report illustrates an effective platform for developing better policy and planning decisions when recommending and designing hurricane risk reduction systems. One of the key lessons learned was to use a system approach when assessing risk to make practicable, rational and defensible decisions. Assessing risk facilitates rational decision making in several areas, including:

- "Policy-level decisions on best expenditure of funding and other resources to minimize the risk of flooding from hurricanes."
- "Planning level decisions on relative vulnerability of flood prone areas to focus efforts on areas of greatest risk."
- "Planning level decisions on the value of different alternatives for reducing the risk of flooding and losses."
- "Insights for design-level decisions on where to put gates or raise walls to reduce risk."

One of the key areas of assessing risk is accomplished through analyzing a system's performance for a given set of events. This performance is assessed by modeling how each structure and component of the system (levees, floodwalls, gates, etc.) would perform under the forces generated by surge and waves. Results from modeling of the Greater New Orleans Hurricane Storm Damage Risk Reduction system (HSDRRS) illustrated that as components are added to the system, the risk for failure increases. Similar lessons have been assessed in reviewing the Dutch storm surge risk reduction system. Application of this principle helped lower risk and improve system performance for the Greater New Orleans area.

If Alternative A were implemented, it would likely include over 42 different T-wall sections with 84 levee tie-in points (Figure 3-11). Alternative C only has 17 different T-wall sections with 34 levee tie-in points. Most of these T-walls locations are to address pipeline crossings. Alternative A crosses 70 pipelines vs. 36 pipelines for Alternative C. Relocating pipelines and handling potentially hazards materials adds an additional risk to the environment. The more pipelines that have to be relocated, the higher the inherent risk of working with hazardous materials. There is greater risk to sensitive environments and nearby communities when relocating pipelines that carry hazardous materials.

Results from modeling the HSDRRS system under IPET also indicated that levee reaches with sharp bends and curves tend to stack storm surges and thus impose unacceptable stress on the system and inevitably create high risk areas for failure. These unnecessarily high-risk areas should be smoothed out into longer linear levee reaches when planning levee systems. A smoothed Alternative A was reviewed, but did not eliminate the tie-in issues discussed above until the alignment mimicked Alternative C.

Another area of risk assessment is the vulnerability of flooding related to residual risk. The flood risk that remains when a flood damage reduction project is implemented is called "Residual Risk". Risk experts agree and IPET illustrated that there will always be residual risk with any system. It is imperative that flooding vulnerability from extreme events is factored into planning decisions. These decisions may require designing a system to allow for more effective evacuations or emergency responses to extreme events (i.e. greater than the recommended 100 year level of Risk Reduction). In the case of Alternative A, residual risk is high due to the proximity of the levee alignment to developed areas. Alternative A has the greatest residual risk since overtopping of the levee by storm surge during extreme events would immediately inundate vulnerable populated areas and key emergency service routes. Alternative C is set farther away from the developed areas of the study area and therefore has a lower residual risk in the event of extreme overtopping events.

When reviewing Alternative A's components the alternative includes unnecessarily high-risk areas (Figure 3-11). As a result of past lessons, the USACE could not select Alternative A as capable alternative because it would be counter to these two critical risk assessment areas discussed in the IPET report (i.e., system complexity and residual risk).

Cost is an additional consideration that renders Alternative A impracticable. Annual OMRR&R costs for Alternative A are expected to exceed $10M, whereas the average annual OMRR&R costs for Alternative C is estimated at approximately $5M per year. This is a distinguishing difference between the two alternatives that may be considered unreasonable given the size of the communities. The pre-Katrina HSDRRS system is an example where long term OMRR&R costs should taken into concern when planning a system. History has shown that systems that have very high burdens of OMRR&R costs lead to reduced system reliability, which in turn can develop into higher flooding risks to communities.

3.10 TSP Confirmation

Based on the information presented in Section 3.9, Alternative C still has the lowest total cost (including mitigation), the highest BC ratio, and the highest net benefits. In conclusion, Alternative C is still the plan that maximizes NED benefits while protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements.

4.0 ENVIRONMENTAL CONSEQUENCES FOR COMPARATIVE ANALYSIS (*NEPA Required)

This chapter describes the direct, indirect and cumulative environmental consequences of implementing the proposed hurricane and storm damage risk reduction plans. The order of discussion on resources mirrors that in Chapter 2. As detailed in Chapter 3, after completion of the draft report, final feasibility level designs were developed for the TSP (Alternative C) including additional field work, H&H model runs, and Wetland Value Assessments. As discussed in Section 3.9.5, in order to conduct a comparative analysis of the Final Alternative Array, Alternatives A and D were "brought up" to a similar level of detail using assumptions derived from data collected during the final feasibility design of the TSP. (See Table 3-9). Estimates developed in connection with that analysis provide the basis upon which the potential impacts (effects) of the alternatives in the Final Alternative Array to significant resources were compared to the No Action Alternative (future without-project conditions).

4.1 WATER ENVIRONMENT

4.1.1 Flow and Water Levels

Recommended Plan - Alternative C

Direct and Indirect Impacts: Structural measures would provide storm damage risk reduction for those areas with the greatest human development, including: Laplace and the immediately surrounding area of St. John the Baptist Parish; and the town of Montz, in St. Charles Parish. This alternative would reduce the risk of flow and water levels in the interior of the protected levee and pump system during a storm surge. During such an event the levee system would be closed thereby causing interior (protected side) water stages and flows to decrease, while being similar for rainfall events. For the exterior (unprotected side), water stages during storm events along the east bank of St. James Parish and east bank of Ascension Parish could increase when the levee system is closed. For more information, see section 3.9.4 of this report. Furthermore, the length of time water would inundate the swamps directly adjacent to the levee on the unprotected side could be less than under the No Action Alternative, as there could be less storm surge to drain from the interior with the proposed levee and associated features in place.

In St. James Parish, there are localized storm surge risk reduction measures consisting of approximately 4 miles of berms surrounding groups of structures (polders) that would directly impact the area within the proposed footprints. These areas currently consist of upland and open water. Approximately 0.17 acres of existing drainage canal open water would be directly converted into upland grass covered (berm) habitat. Another 0.02 acres (4 locations) would be converted to berms with culverts and flap gates. Of the 14,486 existing residential structures located in St. James Parish, an estimated 14 residential structures could be potentially elevated. Individual berms would be separately constructed around 9 non-residential structures. There would likely be no effects to flows or water levels attributable to this measure in the St. James Parish area.

Major indirect impacts of the structural measures would be a decrease in tidal interchange between the interior (protected side) and exterior (unprotected side) areas of the proposed levee alignment. The parallel drainage canals (modifications to the interior drainage system which have been included to mitigate for project-induced interior storm damage), would operate by gravity drainage, with pumps operating only during storm events that result in high exterior water levels. It was estimated the pumps would be operated, on average, for 1.7 storm events per year which equates to closure of gate structures on average 8.5 days per year. Consequently, hydrologic connectivity would generally be maintained between the wetlands within the 47 square mile levee-enclosed area and the surrounding swamps and Lakes Maurepas and Pontchartrain except during the closing of the system for storm events. Rainfall and high tides would still cause significant flooding of the swamps within the levee-enclosed area. As stated above, the system would only prevent flooding of these areas under storm events. Preliminary hydrologic modeling (that does not include rainfall) indicates that future without-project daily water stages on the protected side would be similar to future with-project conditions except during storm events as described above. Hydrologic modeling performed for the detailed feasibility designs later confirmed this.

Early in the planning process, the PDT identified the potential for significant indirect impacts of structural measures brought about by a decrease in hydrologic connectivity/tidal interchange between the interior (protected side) wetlands and exterior (unprotected side) wetlands and surrounding areas of the proposed levee alignment. In order to evaluate water levels and water flows that may be impacted by the structural alignment, a 1D HEC-RAS hydraulic model was completed on Alternative D during the alternatives screening phase. The hydraulic model was run on Alternative D because this was considered to be the alignment that had the highest potential to impact swamp due to the amount of wetlands it would enclose. Although this modeling was done for Alternative D only, the results are expected to be similar for the area enclosed by Alternative C since all the area enclosed by Alternative C is further enclosed by Alternative D. The limitation of the 1D HEC-RAS model is that it averages water surface across an area. This means that the model reflects stages that are separated by large geographic distances are the same when in reality there would be variations in water surface elevations. This gives a broad view of how potential tidal interchange is operating both in the without and with-project conditions.

Results of a 1D HEC-RAS hydraulic model (that does not include rainfall) indicated that future without-project water elevations on the protected side would be similar to future with-project conditions, except during storm events. That notwithstanding, to offset the risk of potential indirect impacts that could not be accounted for in the 1D HEC-RAS model, and to avoid and/or mitigate for any potential impact[1], parallel drainage canals were designed for the 18.27 mile levee of the recommended plan. These canals (one located on either side of the levee alignment) and six gated water control structures through the levee were designed to operate by gravity drainage. Pump stations would only be operated during storm events that result in high exterior water levels, during which the water control structures would be closed. It was estimated that pump operation and water control structure closure would occur, on average, for 1.7 storm events per year which equates to the closure of water control structures on average 8.5 days per year. Consequently, hydrologic connectivity/tidal interchange would be maintained between the wetlands within the 47 square mile levee-enclosed area and the surrounding swamps and Lakes Maurepas and Pontchartrain at all times except during the closing of the gates for storm events.

A HEC-RAS/HMS model, which specializes in rainfall movement and drainage, was performed on Alternative C during feasibility level of design. The results from the HEC-RAS/HMS model were used to size the pump stations and gated structures to eliminate potential interior rainfall flooding impacts during the closing of the gates for storm events. The majority of drainage in the study area is confined to these major canals and waterways.

Based on both the 1D HEC-RAS and HEC-RAS/HMS modeling data, the six proposed gated water control structures were appropriately sized and strategically placed along Alternative C in areas where gravity drainage through canals already exists (e.g. Hope Canal, Reserve Relief Canal, Mississippi Bayou, etc.) to maximize hydrologic connectivity/tidal interchange within the system. As noted above in this section, canals on either side of the levee system have been incorporated into the design of the system to further facilitate hydrologic connectivity/tidal interchange between the flood and protected side of the levee. Generally speaking, if any of the six proposed water control structures in Alternative C were to be removed, there could be a greater loss of hydrologic connectivity/tidal interchange within the enclosed wetlands since existing drainage canals would be closed.

To ensure that Alternative C does not impact hydrologic connectivity/tidal interchange more than anticipated, a 2D model which specializes in water circulation within a system will be run during PED to further validate the findings of the 1D HEC-RAS model and the rainfall model that was conducted to appropriately size the pump stations and drainage structures for Alternative C. The 2D model will determine

[1] Due to the risk of potential indirect impacts that could not be accounted for in the 1D HEC-RAS model as outlined above, and the delay in removing water from the area the HET included impacts to two values in the WVA analysis: V2 (stand maturity) and V3 (water regime). This information is included in Appendix A, Annex R (WVA Analysis).

if the six water control structures, as currently sized and located, are sufficient to maintain current hydrologic connectivity/tidal interchange. A 2D model is the most appropriate model that contains the level of detail required in order to give a "construction ready" accurate design of the control structures. It is feasible to modify these structures as appropriate during PED. This could result in enlargement, shrinkage, or small scale change in location to maximize efficiency of the tidal regime.

Figure 4-1 displays the with- and without-project water elevations for both the exterior and interior sides of the levee system. Flows into and out of the system (not including rainfall) would also be similar to future without-project conditions, but there could be a time lag under the future with-project conditions.

Figure 4-2 displays Alternative D modeling simulation flows during the month of May for Area 5 near the Bonnet Carré Spillway. For this area, there was roughly 75% the amount of interchange over the same time period for with-project versus without-project. In addition, on average, there was a 10-minute lag in the timing of the flows. This time lag would have little, if any, indirect impacts on flows or water elevations.

To ensure that the current design assures tidal connectivity, a 2D model which specializes in water circulation within a system will be run during PED to further validate the findings of the 1D HEC-RAS model.

The structural component of the Recommended Plan has the potential to increase stages to the areas exterior to the levee. These areas include the east bank of St. James Parish and the Gonzales and French Settlement areas in Ascension Parish. Based on advanced circulation modeling (ADCIRC) studies, induced flooding in the study area is minimal (see section 3.9.4). Storm surge modeling of the with-project conditions (those conditions with the structural component of the Recommended Plan in place) which was performed during feasibility found increased stages during a storm event that ranged between 0.1 and 0.2 feet of water. These elevated water stages were observed between the 50-500 year events. No induced flooding was observed in storm surge events between the 1-25 year events. There is a margin of error in both the economic model and the storm surge modeling (ADCIRC) which is recognized by team hydrologists and economists. The ADCIRC modeling will be refined during preconstruction engineering and design to determine whether or not there will be induced flooding and to precisely estimate its magnitude.

Alternative A

Direct and Indirect Impacts: Impacts for structural measures would be similar to the Recommended Plan, except they would occur over a smaller area (38 square miles enclosed area). Alternative A has the potential to increase flood stages in the immediate areas exterior to the levee. However the affected area would be of a smaller footprint than the influence area of the Recommended Plan. Direct and indirect impacts of localized storm surge risk reduction measures would be the same as those identified for the Recommended Plan.

Alternative D

Direct Impacts: Impacts would be similar to the Recommended Plan except over a much larger area (160 square miles) including the areas with the greatest human development within St. Charles and St. James and St. John the Baptist Parishes. There would be no difference due to Maximum Width (MaxW) [2] or Minimum Width (MinW) variation of this alternative on this resource. The western-most portion of the Alternative D levee alignment would extend outside of the authorized project area into Ascension Parish to

[2] Because of the lack of detail as it relates to the required width of the Alternative D levee as it extends to the west, estimates were developed for two variations of Alternative D: Maximum Width (MaxW) and Minimum Width (MinW). Estimates for both variations were developed to capture any change in potential impacts that may result from an increase in Alternative D's footprint brought on by an increase in levee width. The Maximum Width is the same levee width used for the final feasibility designed TSP. The Minimum Width uses the width identified for the final feasibility designed TSP for that portion of the levee where the TSP overlaps with Alignment D and for the remaining 19.74 miles, the original width estimates reported in the Draft Report. Due to the fact that the Recommended Plan -Alternative C (Recommended Plan) and Alternative A overlap for approximately 6 miles and at the greatest distance is only separated by approximately 1.25 miles. The width for Alternative C was used for all of Alternative A. This assumption has a low risk.

tie into an existing non-Federal levee. This alternative would directly impact flow and water levels in the interior (protected side) and exterior during rainfall and hurricane events. Interior water stages and flows would likely decrease for hurricane events, while being similar for rainfall events (assuming that the drainage structures or pumps are operating).

Indirect Impacts: Impacts would be similar to the Recommended Plan, except over a larger area (160 square mile enclosed area) and with the following exception: Alternative D would have the potential to increase stages to areas exterior to the proposed levee alignment. In the case of Alternative D, these areas include Ascension and Livingston Parishes. Due to the larger area being taken out of the flood plain, the probable affected area could be much larger than the influence area of the Recommended Plan.

4.1.2 Sedimentation and Erosion

Recommended Plan - Alternative C

Direct and Indirect Impacts: Implementing the proposed action would require approximately 9,000,000 cubic yards of borrow material for the structural levees and the berms. However, best management practices would be used to avoid, minimize and reduce potential sedimentation and erosion impacts during borrow excavation. Construction of levees, earthwork fill, placement of geotextile, T-walls, storm damage gates, drainage gates, sheetpile, riprap, gates and pumping stations would also utilize best construction management practices to avoid, minimize and reduce potential erosion and sedimentation into adjacent wetlands. These impacts would generally be minor and short-term, lasting only during construction of the proposed project features. Indirect impacts would include significant reduction of erosion and sedimentation associated with storm events.

The placement of structures within waterways intersecting the levee alignment has the potential to create a sedimentation/erosion maintenance issue directly upstream and downstream of the structure. However, these structures would be designed and scour protection would be placed to minimize sedimentation/erosion issues. Several pumping stations would also be placed along the waterways that would intersect the levee alignment. These pump stations have the potential to cause severe erosion in the vicinity of the suction and discharge areas. The pump stations would be designed and scour protection would be placed to minimize sedimentation/erosion issues. Despite best efforts, sedimentation/erosion issues may still exist. The proposed action has the potential to decrease tidal interchange velocities throughout the area resulting in increased sedimentation within waterways of both the interior and exterior of the proposed levee alignment.

Alternative A

Direct and Indirect: Impacts would be similar to the Recommended Plan except over a smaller area. Approximately 10,100,000 cubic yards of borrow would be needed.

Alternative D

Direct and Indirect: Impacts would be similar to the Recommended Plan except over a larger area. Approximately 13,800,000 and 12,100,000 cubic yards of borrow would be needed for the MaxW and MinW, respectively.

4.1.3 Water Quality and Salinity

Recommended Plan - Alternative C

Direct and Indirect Impacts: Some wetland and open water areas (see section 4.3.1 for details) would be converted into upland habitat for construction of hurricane risk reduction features and would no longer provide water quality benefits. Because fill and construction materials are anticipated to be free of contaminants, discharge of these materials into existing adjacent waters is not expected to result in adverse effects to aquatic organisms. Construction impacts to runoff would be minimized through implementation of a Stormwater Pollution Prevention Plan (SWPPP) (USEPA 2012). Indirect impacts include water exchange between the flood and protected side of the levee system which could lead to localized areas of stagnation and reduced salinity on the protected side of the levee and local areas of increased salinity on the flood side of

the levee system. Additional development in areas behind the levee alignment could lead to additional point and nonpoint discharges within these areas. Structure operation is expected to impact biogeochemical cycling for wetlands within the proposed alignment. There would be brief indirect impacts during the construction of the localized storm surge risk reduction measures to the surrounding open water due to runoff from the construction of the berms and flap gates. There would be no impact on salinity since the material that is being brought in is not expected to have a high salt concentration. See Water Quality Analysis at Appendix A, Annex M for more details.

Alternative A

Direct and Indirect: The alignment of this alternative would minimize further impoundment of wetlands (3,653 acres as compared to 8,521 acres for the Recommended Plan); hence, water quality impacts would be expected to be similar in nature, but lesser in extent, than impacts associated with the Recommended Plan.

Alternative D

Direct and Indirect: This alternative encloses the largest area by a significant margin (56,677 acres) while also having the greatest amount of new levee construction. Water quality impacts associated with this alternative would be expected to be similar in nature but greater in extent than impacts associated with the Recommended Plan. The MaxW variation would have a greater impact on wetlands resulting in a greater loss of water quality filtering by those lost wetlands. .

4.2 HUMAN ENVIRONMENT

4.2.1 Population and Housing

Recommended Plan - Alternative C

Direct and Indirect Impacts: Structural measures would have no direct impacts to population and housing. The localized storm surge risk reduction measure of elevating 14 residential structures would cause residents temporary inconveniences related to relocating to a temporary residence. The indirect impacts of raising structures include a reduced ease of access to structures, as some residents would have to approach the entrances to their homes by way of a stairway, ramp, or lift. Indirect impacts for the structural and localized storm surge risk reduction features include reduced risk of damage from hurricane and tropical storm surge events. This would potentially enhance the stability and sustainability of population and housing resources located behind the levee and berm alignments. It is anticipated that local parish building codes would place restrictions requiring the elevation of future construction in the area.

Alternative A

Direct and Indirect Impacts: Impacts would be similar to the Recommended Plan, except construction of the levee would be closer to development in Alternative A, thereby creating a greater chance of temporarily decreasing property values due to added traffic congestion, noise and dust during the construction..

Alternative D

Direct and Indirect Impacts: Impacts would be the same as the Recommended Plan, except localized storm surge risk reduction measures would not be included. There would be no difference due to MaxW or MinW variation of this alternative on this resource.

4.2.2 Employment, Business and Industrial Activity (including Agriculture)

Recommended Plan - Alternative C

Direct and Indirect Impacts: Proposed structural measures would cause the a swamp tours temporary loss of access to the adjacent waterway until construction of boat access to the waterway is restored following construction of this reach of the project. The localized storm surge risk reduction measure of flood proofing non-residential structures could temporarily interrupt business operations, although it is possible these businesses could continue operating during the retrofitting process. Indirect impacts for both the structural and localized storm surge risk reduction features include reduced risk of damages from hurricane and tropical storm surge events. These risk reduction measures would allow businesses and industries to resume normal

operations in a shorter period of time following a storm event. It is anticipated that local parish building codes would place restrictions on the elevation of future construction in the area. In contrast to the potential adverse effects to the St. James Parish area described above, the St. Charles and St. John the Baptist Parishes areas would generally benefit from implementation of the hurricane and storm surge damage risk reduction measures which would allow these businesses, industries and agricultural operations to continue to operate during minor storm events not requiring evacuation.

Alternative A
Direct and Indirect Impacts: Impacts would be the same as the Recommended Plan.

Alternative D
Direct and Indirect Impacts: Impacts would be the same as the Recommended Plan except all three parishes would be behind the levee alignment allowing for continued operation of businesses, industries and agriculture in St. James Parish during a storm minor surge event not requiring evacuation. There would be no difference due to MaxW or MinW variation of this alternative on this resource.

4.2.3 Public Facilities and Services

Recommended Plan - Alternative C
Direct and Indirect Impacts: Structural measures would not directly impact public facilities or services. The localized storm surge risk reduction measure of flood proofing public facilities could temporarily interrupt these services and inconvenience users until the retrofitting process has been completed. Indirect impacts for both the structural and localized storm surge risk reduction features would include reduced risk of damage from hurricane storm surge for public facilities and services.

Alternative A
Direct and Indirect Impacts: Impacts would be the same as the Recommended Plan.

Alternative D
Direct and Indirect Impacts: Impacts would be the same as the Recommended Plan except for the absence of the indirect impacts associated with localized storm surge risk reduction measures in the Gramercy/Lutcher area. There would be no difference due to MaxW or MinW variation of this alternative on this resource.

4.2.4 Transportation

Recommended Plan - Alternative C
Direct and Indirect Impacts: There would be no significant direct impacts. Rather, there would be minor temporary impacts in the form of increased vehicular congestion along roads, highways and streets during construction which cease following completion of construction activities. There would also be a degradation of the transportation infrastructure, primarily local roads and highways, as a result of the wear and tear from transporting construction materials. Indirect impacts would include a lower risk of storm damage-related damages to the transportation infrastructure for areas behind the proposed levee alignment, inside the polders and south of the highways where flap gates are put in. Because the Recommended Plan does not reduce risk to those sections of highway previously inundated during tropical storm/surge events, there would be no change in accessing the area during or directly after a storm event that required evacuation compared to the no action alternative.

Alternative A
Direct and Indirect Impacts: Impacts would be the same as the Recommended Plan.

Alternative D
Direct and Indirect Impacts: Direct impacts would be similar to the Recommended Plan, except construction impacts, such as traffic congestion and deterioration of the transportation infrastructure, could affect a total of 28 miles of roads. Indirect impacts would be similar to the Recommended Plan, except risk reduction from

storm surge events to transportation infrastructure would extend into the western portion of the project area. This alternative could reduce the risk of inundation to the ground level section of I-10 in the western portion of the area which could improve access for emergency responders and prevent delays of local and regional residents returning to residences after storm events. There would be no difference due to MaxW or MinW variation of this alternative on this resource.

4.2.5 Community and Regional Growth

Recommended Plan - Alternative C

Direct and Indirect Impacts: There would be no direct impacts from the structural or non-structural measures. Indirect impacts for both the structural and localized storm surge risk reduction features of the alternative include reduced hurricane storm damage risk reduction for communities thereby contributing to potential growth opportunities for communities in the three-parish area. The proposed action could enable community growth to occur as the lower incidence of storm surge damage allows communities to focus more on community-building activities rather than on preparing for and recovering from storm surge events.

Alternative A

Direct and Indirect Impacts: Impacts would be the same as the Recommended Plan.

Alternative D

Direct and Indirect Impacts: Direct and indirect impacts would be similar to the Recommended Plan. There would be no difference due to MaxW or MinW variation of this alternative on this resource.

4.2.6 Tax Revenues and Property Values

Recommended Plan - Alternative C

Direct and Indirect Impacts: Property values near levee and localized storm surge risk reduction measure construction sites may decrease temporarily due to added traffic congestion and construction noise and dust. These impacts would be temporary and minor, lasting only during construction. It is unknown at this time if elevating structures would have any effects on property values. Currently, there are 14 residential being considered for elevating and 9 non-residential structures being considered for flood proofing. Indirect impacts could include increases in tax revenues and property values due to the increased hurricane storm damage risk reduction for residential properties and businesses.

Alternative A

Direct and Indirect Impacts: Impacts would be the same as the Recommended Plan. Construction of the levee would be closer to development than the Recommended Plan, thereby creating a greater chance of temporarily decreasing property values due to added traffic congestion, noise and dust during the construction.

Alternative D

Direct and Indirect Impacts: Direct impacts would include structural hurricane and storm surge damage risk reduction affecting tax revenues and property values not only for the St. Charles and St. John the Baptist Parishes, but also St. James Parish. Indirect impacts would be similar to the Recommended Plan except over a three-parish area. But there would be no impact due to the localized storm surge risk reduction measures. There would be no difference due to MaxW or MinW variation of this alternative on this resource.

4.2.7 Community Cohesion

Recommended Plan - Alternative C

Direct and Indirect Impacts: There would be no direct impacts from the structural measures. However, if residential structures are elevated then the residents would be temporarily relocated and community cohesion would be disrupted during the time the structures are being elevated. Currently, there are 14 residential structures being considered for elevating and 9 non-residential structures for flood proofing. Indirect impacts for both the structural and localized storm surge risk reduction features include reduced storm damage risk

for communities thus preserving the spatial patterns of social interaction and maintaining community cohesion.

Alternative A
Direct and Indirect Impacts: Impacts would be the same as the Recommended Plan.

Alternative D
Direct and Indirect Impacts: Direct impacts would include structural hurricane and storm surge damage risk reduction for the St. Charles, St. John the Baptist and St. James Parishes. Direct and indirect impacts associated with localized storm surge risk reduction measures would not be present under this alternative. There would be no difference due to MaxW or MinW variation of this alternative on this resource.

4.2.8 Environmental Justice

Recommended Plan - Alternative C
Direct and Indirect Impacts: The construction of the levee may have minimal short term impacts to residences located behind the levee but these impacts would be the same regardless of race or income thereby eliminating any Environmental Justice concerns in relation to those communities located behind the levee alignment.

There are two components of the residential localized storm surge risk reduction plan that provide hurricane/tropical storm risk reduction to residents in St. James Parish: 1) Berms constructed around groups of residential structures and 2) elevation of a limited number of residential structures.[3] Details of the residential localized storm surge risk reduction features can be found in Section 5.1.

Construction of the first component, the berms in St. James Parish, will provide a similar level of risk reduction to residents as will the structural alignment in St. John the Baptist, in year 2020. In the future, the level of risk reduction provided by the localized storm surge risk reduction measures would depend on the actual rate of RSLR. Without any improvements (i.e. lifts), the level of risk reduction in year 2070 is estimated to fall between the 25 yr and 50 yr probability storm surge stages based on the intermediate RSLR scenario. This lower level of risk reduction may allow flooding to occur behind the berm in later years. Due to RSLR, there could be an impact to those homes in the localized storm surge risk reduction area in St. James Parish that would not occur to homes protected by the structural alignment.

Implementation of the localized storm surge risk reduction component that constructs a berm around groups of residential structures could impact the following four communities in St. James Parish: Lutcher, Gramercy, Grand Point and Convent. These communities are identified as the "Project Impact Area." Two of these are EJ communities (Lutcher and Convent). Because there are EJ communities in the Project Impact Area, a determination must be made if these impacts are disproportionate to minority or low-income residents.

Table 4-1 shows the white and minority population of the 3-parish area and of the Project Impact Area. Approximately 9% of the 3-parish area white population lives in the Project Impact Area while 8% of the 3-parish area minority residents live in the Project Impact Area. Additionally, only 9% of the 3-parish area low-income population lives in the Project Impact Area.

As illustrated in the below table, the percent of the white and minority population located within the Project Impact Area are nearly equal. As also reflected in the below table, only a small percentage of the 3-parish area low-income households are located in the Project Impact Area. Therefore, the project would not result in a disproportionate adverse impact to minority and/or low-income communities per 2010 U.S. Census information and requirements of E.O. 12898.

[3] Localized storm surge risk reduction measures that address non-residential structures are not addressed by this section of the report.

Table 4-1: Relationship between the Project Impact Area and the 3-Parish Area for EJ Analysis

Population	3-Parish Area	Project Impact Area*	Percent in 3-Parish Area	Percent in Project Impact Area
Total	120,806	10,356	100%	9%
White	62,631	5,542	52%	9%
Minority**	58,175	4,814	48%	8%
Low Income Population	17,063	1,486	14%	9%
* Project Impact Area includes population in Lutcher, Gramercy, Convent and Grand Point all within St. James Parish. **Minority includes non-Hispanic black and other non-white races and Hispanics.				

The elevation of individual residential structures, the second component of the residential localized storm surge risk reduction plan, also takes place in St. James Parish and would provide the same level of risk reduction as the structural alignment for the Project in St. John the Baptist Parish. The overall costs of structure elevation would not be borne by any single individual (minority or low-income) nor the community; rather, these costs would be part of the proposed project costs. There are however costs associated with temporary relocation while construction occurs which may include hotel, meals, and incidentals. These costs can present a temporary burden to low-income residents. However, only 12% of households in Block Group 3 of Census Tract 40400 and Block Group 1 of Tract 40300 have incomes below the poverty level. Additionally, 16% of the population in Census Tract 40400, blocks 3005, 3007, 3014, 3018, 3022 and Census Tract 40300, blocks 1026 and 1058 are minority. These specific Census blocks examined are where the 14 structures indentified for elevation would occur. Therefore, the proposed structure elevations would not cause a disproportionate adverse impact to minority and/or low-income residents.

Implementation of Alternative C would not have a disproportionate adverse impact to minority and/or low-income residents as it would provide additional benefits to safety, life, health and properties of all residents and businesses within the study area regardless of race or income level by reducing the overall level of flood risk by the end of the period of analysis.

Alternative A
Direct and Indirect Impacts: Impacts would be the same as the Recommended Plan.

Alternative D
Direct and Indirect Impacts: Alternative D extends structural measures for hurricane and storm damage risk reduction to all populations located within the area removing any impacts associated with the localized storm surge risk reduction measures. There would be no difference due to MaxW or MinW variation of this alternative on this resource.

4.3 NATURAL ENVIRONMENT

4.3.1 Soils, Water bottoms and Prime and Unique Farmlands

Recommended Plan - Alternative C
Direct Impacts: Due to the levee construction a total of 1,198 acres, would be converted to levee, including 1,176 acres of primarily hydric soils of Cancienne and Fausse soils in St. Charles Parish; and Cancienne and Carville, Barbary, Schreiber and Gramercy soils in St. John the Baptist Parish.

Approximately 14.8 acres of water bottoms in canals such as Reserve Flood Relief Canal and waterways such as the Mississippi Bayou would also be impacted. A total of approximately 128.2 acres of land classified as prime farmlands would be converted to nonagricultural use. Project impacts would be related to the construction of levee earthwork fill, geotextile, T-walls, storm damage gates, drainage gates, sheetpile, riprap, gates and pumping stations. The remaining project-induced impacts would be to existing developed areas such as highways and pipeline rights-of-way. The USACE has coordinated these potential impacts with the

Natural Resources Conservation Service (NRCS) (Appendix A, Annex E) and determined that the proposed conversion would be consistent with the Farmland Protection Policy Act and the USACE's internal policies. It is anticipated that the Bonnet Carré government furnished borrow site has enough borrow material for the entire proposed action.

The proposed localized storm surge risk reduction plan (polders) would result in a direct impact to approximately 10 acres of soils classified as prime farmland. There would be no impacts to water bottoms (Sportsman Pond) resulting from the construction of Polder 1 (Gramercy Berm).

Indirect Impacts: Up to approximately 8,432 acres of hydric soils could be affected due to enclosing the area within the levee and pump system. The levee and pump system would be a gravity drainage system with pumps operated only during hurricane/tropical storm surge events of approximately 1.7 storm events per year and would be closed for approximately 8.5 days per year. Consequently, hydrologic connectivity would be generally maintained with the surrounding swamps and Lakes Maurepas and Pontchartrain, except during the closing of the system for hurricane/tropical storm surge events. Preliminary hydrologic modeling (not including rainfall) indicates that future with-project daily water stages on the protected side would be similar to future without-project conditions. In addition, future with-project flows into and out of the protected system (not including rainfall) would also be similar to future without project conditions, but there could be a brief time lag of approximately ten minutes (Section 4.1.1). The proposed action is not anticipated to convert any existing hydric or non-hydric soils, to a different soil type. Indirect impacts to soils from the localized storm surge risk reduction measures would be minimal as floodgates and pumps would be installed to allow existing drainage to continue when not under surge events, and to remove rainwater during storm events.

Alternative A

Direct and Indirect Impacts: Direct impacts would be similar to the Recommended Plan with the following exceptions: a total footprint of 1,338 acres and impacts of levee/structures construction to 7.8 acres of water bottoms. Additionally, approximately 53.4 acres of land classified as prime farmlands would be converted to nonagricultural use. Indirect impacts would be similar to the Recommended Plan except Alternative A could indirectly affect up to 3,564 acres. The impacts of the localized storm surge risk reduction measures would be the same as the Recommended Plan.

Alternative D

Direct and Indirect Impacts: Direct impacts would be similar to the Recommended Plan with the following exceptions: Alternative D, with a total footprint of 1,836 and 1,611 acres for the MaxW and MinW respectively, would directly impact approximately 1,115 acres of primarily hydric soils of Cancienne and Fausse soils in St. Charles Parish; Cancienne and Carville, Barbary, Schriever and Gamercy soil associations in St. John the Baptist Parish; and Barbary soils in Ascension and St. James Parishes. Alternative D would also directly impact approximately 17.5 acres of water bottoms, including the Blind River and Mississippi Bayou. No prime or unique farmlands would be impacted. Indirect impacts would be similar to the Recommended Plan except Alternative D could indirectly affect up to 56,228 acres.

4.3.2 Vegetation, Wildlife and Fish Habitat Impacts

As discussed in Section 3.9.5, WVA swamp and BLH models were run for the Recommended Plan. AAHU estimates developed for both Alternatives A and D are based on assumptions made during the running of the Swamp WVAs for Alterative C. No new data was collected specific to Alternatives A and D. The WVA models operate under the assumption that optimal conditions for fish and wildlife habitat within a given coastal wetland type can be characterized, and that existing or predicted conditions can be compared to that optimum to provide an index of habitat quality. Habitat quality is estimated and expressed through the use of a mathematical model developed specifically for each wetland type. Each model consists of: 1) a list of variables that are considered important in characterizing fish and wildlife habitat; 2) a Suitability Index graph for each variable, which defines the assumed relationship between habitat quality (Suitability Index) and different variable values; and 3) a mathematical formula that combines the Suitability Indices for each variable

into a single value for wetland habitat quality, termed the Habitat Suitability Index (HSI). The WVA models assess the suitability of each habitat type for providing resting, foraging, breeding, and nursery habitat to a diverse assemblage of fish and wildlife species. This standardized, multi-species, habitat-based methodology facilitates the assessment of project-induced impacts on fish and wildlife resources.

The WVA Swamp model consists of four variables: V1) stand structure; V2) stand maturity; V3) water regime; and V4) mean high salinity during the growing season. When the interagency Habitat Evaluation Team (HET) prepared the WVAs for Alternative C they decided that there would be some impact to both the V1 and V2 for the future with project condition if the water levels inside the levees were held for a longer duration or at a higher level. The other variables would remain the same for both the future without and future with project condition.Alternative C has been designed in a manner to eliminate hydraulic impacts to the enclosed swamp and this design has been verified with the 1D HEC-RAS hydraulic modeling (See Engineering Appendix, Interior H&H). Based on best professional judgment and experience in the vicinity, the HET assumed that placement of the levee would result in a reduction in efficiency of drainage on the protected side thereby affecting water quality and increasing impoundment. The HET assumed that these impacts may not have been adequately captured in the H&H modeling effort or in its margin of error because rainfall had not been included in the model. Based on these assumptions, stand structure (V1) was reduced by 1 class level from the future without project condition to the future with project condition. Maturity (V2) stand data was collected from the project area for baseline estimates. Projections were processed through the WVA Site-Ingrowth spreadsheets that incorporated RSLR into the growth factor regression. The HET took the future without project growth rate numbers and reduced them by -0.2 to account for the expected change in efficiency of drainage for the future with project condition. The sections below presents the results of these changes.

4.3.2.1 Vegetation Resources

Recommended Plan - Alternative C

Direct Impacts: The Recommended Plan would directly impact a total of approximately 1,114 acres of swamp along the reach of the alignment located north of US-61, and approximately 12 acres of dry and/or wet BLH located along the reach of the alignment located south of US-61 (Figure 4-3). Direct impacts from the localized storm surge risk reduction measures would be the conversion of about 1 acre of swamp habitat bordering residential property in St. James Parish into berm habitat. Approximately 0.29 acres of forested wetlands would be impacted by the Gramercy berm; and 0.81 acres impacted by construction of the Grand Point North berm. The certified Swamp and BLH Wetland Value Assessment (WVA) Models were run to determine the impact due to this alternative. Details on the certification, assumption made during for the WVA runs and the actual model runs can be found in Appendix A, Annex R. The results of the WVAs indicate that 595.6 and 95.5 AAHUs of swamp and BLH habitat, respectively, would require mitigation due to direct impacts.

Indirect Impacts: The Recommended Plan could potentially indirectly impact up to approximately 8,432 acres (494.5 AAHUs) of primarily forested wetlands/swamp habitats and 89 acres (3.1 AAHUs) of BLH used by fish and wildlife for shelter, nesting, feeding, roosting, cover, nursery and other life requirements. This would include cypress-tupelo swamp, swamp milkweed, floating antler fern and rooted spike-rush (LDWF 2013), listed species and rare, unique or imperiled vegetative communities in the project area. However, preliminary hydrologic modeling indicates that the project design would have minimal changes to flows or stages on either the protected or unprotected sides. To accomplish this, the proposed levee system designs would include culverts with sluice gates joining directly with each of the existing culverts under I-10. Similarly, culverts would be included within the levee system along those levee reaches presently open to the surrounding wetlands system in order to retain hydrologic connectivity between the protected and unprotected areas. These structures would only be closed on average for 1.7 storm events annually, or about 8.5 days annually.

Additional indirect impacts would be the potential prevention of saltwater intrusion into the levee-enclosed system when structures are closed for hurricane/tropical storm surge events. Gates, like those along the Reserve Relief Canal, and levee culverts would be closed for hurricane/tropical storm surge events on average frequency of about 1.7 times per year; which would result in the closure of the levee system for an average duration of about 8.5 days per year. Closure of the levee system during these storm surge events would reduce minor salt water intrusion into wetland habitats enclosed by the levee system. This could provide some reduction of the potential ecological stresses associated with saltwater intrusion and could also help reduce the conversion of existing forested wetlands and swamps to marsh and open water habitats.

The total direct and indirect impacts that would require mitigation is 1,188.7 AAHUs.

Alternative A[4]
Direct Impacts: Direct impacts would be similar to the Recommended Plan except 1,389 acres (estimated 747.9 AAHUs) of forested wetlands and swamp, and 123 acres (95.5 AAHUs[5]) of BLH would be impacted.

Indirect Impacts: Indirect impacts would be similar to the Recommended Plan except 3,564 acres (estimated 747.6 AAHUs) of forested wetlands and swamp habitat and 89 acres (3.1 AAHUs) of BLH would be impacted.

The total estimated direct and indirect impacts that would require mitigation under Alternative A is 1,038.0 AAHUs – an estimated 150.7 AAHUs less than the Recommended Plan.

Alternative D[6]
Direct Impacts: Direct impacts would be similar in nature but greater in extent to those reported in connection with the Recommended Plan. An estimated 1,951 acres (estimated 1,032.4 AAHUs) for MaxW and 1,712 acres (estimated 905.88 AAHUs) for MinW of forested wetlands and swamp could be directly impacted. There would be on direct impacts to BLH.

Indirect Impacts: Indirect impacts would be similar in nature but greater in extent to those reported in connection with the Recommended Plan. Under both the MaxW and MinW scenarios, up to 56,588 acres (estimated 2,235.8 AAHUs) of swamp and 89 acres (3.1 AAHUs) of BLH could be impacted.

The total estimated direct and indirect impacts that would require mitigation under Alternative D is 3,268.2 AAHUs and 2,867.69 AAHUs for the MaxW and MinW, respectively – an estimated 2,079.5 AAHUs and 1,678.99 AAHUs greater than those reported in connection with the Recommended Plan.

4.3.2.2 Wildlife Resources

Recommended Plan - Alternative C
Direct and Indirect Impacts: Approximately 9,758 acres of wildlife habitat would be directly or indirectly impacted. During construction any wildlife present would relocate to avoid the construction but would quickly return to the area after construction ends. Wildlife access into and out of the levee-enclosed system would not be significantly impacted as most wildlife are highly mobile. For example, quadrupeds such as deer, bobcats, bear and rabbits would be able to cross the levees to access habitat on either side of the alignment. However aquatic wildlife such as manatee cannot traverse the levee, while other semi aquatic wildlife such as turtle, alligators, otters, frogs, etc may choose not to traverse the levee even though they may be capable of it.

[4] AAHUs for both Alternative A and D are estimates based on assumptions made during the running of the swamp WVAs for Alterative C. No new data (WVAs) was collected to determine AAHUs specific to Alternatives A and D. See section 3.9.5 for further discussion.
[5] The tracts of land where BLH habitat is found are impacted in same manner by all three alternatives. Therefore the BLH WVA for Alternative C is also accurate for Alternative A and Alternative D.
[6] AAHUs for both Alternative A and D are estimates based on assumptions made during the running of the swamp WVAs for Alterative C. No new data (WVAs) was collected to determine AAHUs specific to Alternatives A and D.

Various structures are designed into the system to allow for water exchange during the majority of the year except during hurricane/tropical storms. As noted, aquatic wildlife would face temporary limits to transit between both sides of the alignment when structures are closed to block storm surge. However, restriction from transiting between both sides of the structure would be temporary and would occur, on average, only an estimated 8.5 days per year due to closure of the levee system during hurricane/tropical storm surge events. Closure of the levee system during these storm surge events would also reduce some degree of salt water intrusion into wetland habitats enclosed by the levee system. This could provide some reduction of the potential ecological stresses associated with saltwater intrusion and could also help reduce the conversion of existing forested wetlands and swamps wildlife habitat to marsh and open water habitats thereby protecting enclosed cypress-tupelo swamp for continued wildlife use. This would be especially important as RSLR is projected to increase.

Avian species would lose forested habitat along the alignment. However this habitat would be replaced at mitigation sites. Some wildlife may avoid the open landscape of the levee corridor while others could be attracted to the area for hunting or to use it for transition to other parts of the study area.

Alternative A

Direct and Indirect Impacts: Direct impacts would be similar to the Recommended Plan except 5,174 acres of wildlife habitat would be impacted. This represents a 47% reduction in the number of acres impacted when compared to the Recommended Plan but only a 13% reduction when comparing the impacts in habitat value (AAHUs). This is due to the fact that 100% of the direct impact acres (swamp converted to levee) do not have habitat value using the WVA models. Since there are less enclosed wetlands there would less area with restricted access to aquatic wildlife.

Alternative D

Direct and Indirect Impacts: Direct impacts would be similar in nature to the Recommended Plan but greater in extent with an estimated total of 58,628 acres of wildlife habitat impacted. This represents a 501% increase in the number of acres impacted and a 175% increase when comparing the impacts in habitat value (AAHUs) for the both the MaxW and MinW. Because Alternative D encloses a larger area there would be a greater number of acres with restricted aquatic wildlife access.

4.3.2.3 Aquatic and Fisheries Resources

Recommended Plan - Alternative C

Direct and Indirect Impacts: Approximately 1,114 acres of existing benthos swamp habitat would be converted into upland grass covered (levee) habitat. Sessile organisms would be buried during construction. Mobile species of fish, shellfish and other aquatic resources would either avoid the area during construction (fish) or be moved out of the way due to water displacement (plankton). Up to 8,432 acres of forested wetland and swamp habitats utilized by aquatic and fishery recourses could be indirectly impacted. However, preliminary hydrologic modeling indicates that the project design would have minimal changes to flows or stages on either the protected or unprotected sides. The WVA for this project shows an estimated 34% reduction in the overall habitat suitability due to indirect impacts of the levee over the project life.

Aquatic organism access into and out of the proposed action area would be impacted; additional culverts may deter some species from swimming through those structures. Aquatic species would be temporarily restricted from entering the proposed action area on average about 8.5 days per year due to closing gates and culverts in preparation for storm surge. This impact could be significant for the catadromous American eel that needs the fresh water areas for development and access to the ocean for breeding. If the closures occur, when the elvers stage enter the swamps there would be a recruitment age class loss. For marine species the impact would not be significant because their movement into the area is less dependent on tidal action and stage of development. Fresh water species would breed in the enclosed area for the most part and would not be indirectly impacted by the closure.

Approximately 0.17 acres of existing drainage canal bottom would be directly converted into upland grass covered (berm) habitat another 0.02 acres (4 locations) would be converted to a berm with culverts and flap gates due to the localized storm surge risk reduction measures. Sessile organisms would be buried during construction. Mobile species of fish, shellfish and other aquatic resources would either avoid the area during construction (fish) or be moved out of the way due to water displacement (plankton). The operation of the 150 flap gates would result in a repetitive temporarily indirect impact on aquatic organisms. Species would be restricted from entering the proposed action area on average about 8.5 days per year due to closing gates in connection with storm surge events.

Alternative A

Direct and Indirect Impacts: Direct impacts would be similar to the Recommended Plan with the following exceptions: approximately 1,398 acres of benthos would be directly impacted due to the longer levee alignment representing an estimated 25% increase in impacts over those identified in connection with the Recommended Plan. Indirect impacts would be similar to the Recommended Plan except Alternative A would enclose approximately 3,564 acres of aquatic habitat; hence, there would likely be a less significant impact on the American eels – an estimated 58% reduction. The impact from the localized storm surge risk reduction plan would be the same as the Recommended Plan.

Alternative D

Direct and Indirect Impacts: Direct impacts would be greater than the Recommended Plan. Under the MaxW scenario, approximately 1,951 acres of benthos would be directly impacted – an estimated 75% increase over those reported in connection with the Recommended Plan. Under the MinW scenario, approximately 1,712 acres of benthos would be directly impacted – an estimated 54% increase over those reported in connection with the Recommended Plan. Indirect impacts would also be greater than those reported for the Recommended Plan. Approximately 56,588 acres of aquatic habitats would be enclosed in the levee system; representing a 571% increase in impacts on American eels under the MaxW and MinW scenario.

4.3.3 Essential Fish Habitat (EFH)

Recommended Plan - Alternative C

Direct and Indirect Impacts: the Recommended Plan would have no direct or indirect impacts on EFH since no EFH intersects the structural or localized storm surge risk reduction areas or the proposed enclosed area in the near term (Figure 2-7). Closure of the levee system during hurricane/tropical storm surge events would reduce minor salt water intrusion into wetland habitats in the proposed levee system. This could provide some reduction of the potential ecological stresses associated with saltwater intrusion and could also help reduce the conversion of existing forested wetlands and swamps to marsh and open water habitats (EFH).

Alternative A

Direct and Indirect Impacts: Impacts would be similar to the Recommended Plan.

Alternative D

Direct and Indirect Impacts: There would be no direct impact to white shrimp EFH. There would be direct impacts to red drum EFH where the gate on Blind River is built. The soft bottom habitat, EFH red drum habitat, in the footprint would be permanently removed from use. Red drum EFH areas located within the construction turbidity plume may not be usable during construction. However, this impact would be temporary. The EFH area of Blind River inside the proposed levee system could be slightly less accessible by red fish after the levee structure is in place. However, the intent of the tentative levee design is to allow for existing flows and cross sections and should not hinder red fish access. There would be no difference due to MaxW or MinW variation of this alternative on this resource.

4.3.4 Threatened and Endangered Species

Recommended Plan - Alternative C

Direct and Indirect Impacts: Based on review of existing data and preliminary field surveys, the USACE finds that implementation of the proposed action would have no effects on any known listed species or their critical habitat, bald eagles or colonial nesting waterbirds. The Recommended Plan would directly impact (destroy) the following acres of habitats potentially utilized by the bald eagle and colonial nesting waterbirds: a total of 1,237 acres primarily swamp habitats and BLH. Other, adjacent forested wetlands and swamp habitats are available for use by listed species, the Bald Eagle and colonial nesting waterbirds. The Recommended Plan could potentially indirectly degrade up to approximately 8,521 acres of swamp and BLH habitats potentially utilized by the bald eagle and colonial nesting waterbirds. However, preliminary hydrologic modeling indicates that the project design would have minimal changes to flows or stages on either the protected or unprotected sides.

Access into and out of the project area would not be significantly impacted for the bald eagle or colonial nesting waterbirds. Gulf sturgeon and the West Indian Manatee would be temporarily restricted from entering the proposed action area on average about 8.5 days per year due to closing gates and culverts in connection with storm surge events.

To deter colonial nesting water birds from establishing active nesting colonies in the construction areas, a Nesting Prevention Plan would be developed, in coordination with the USFWS and LDWF. If measures to prevent colonial nesting bird populations are not successful in the area, construction-related activities that would occur within 1,000 feet of a colony could be restricted to the non-nesting period, which in this region generally extends from September 1 to February 15, depending on the species present. This restriction would likely pose significant problems to construction activity schedules. If wading bird nesting colonies become established in the area, the 1,000 foot buffer must be maintained unless coordination with the USFWS indicates that the buffer zone may be reduced based on the species present or an agreement is reached with USFWS that allows a modified process to be adopted.

There are existing bald eagle nests in the area; however, based on information provided by USFWS, all nests are beyond 1,500 feet from the proposed project alignments. Two potentially active waterbird rookeries exist within 1,000 feet of the proposed alignments. Before construction, the USFWS and USACE will survey the area to confirm if the rookeries are active or not. USFWS guidelines would be utilized during construction to avoid any impacts to above described species, if encountered.

Alternative A

Direct and Indirect Impacts: Direct impacts would be similar to the Recommended Plan except an estimated total 1,521 acres of swamp and BLH habitat will be directly impacted (destroyed). Other, adjacent forested wetlands and swamp habitats are available for use by the bald eagle and colonial nesting waterbirds. Indirect impacts would be similar to the Recommended Plan except up to 3,654 acres of swamp and BLH could potentially be indirectly impacted. The implementation of Alternative A would have no effect on any listed species or their critical habitat, bald eagles or colonial nesting waterbirds.

Alternative D

Direct and Indirect Impacts: Direct impacts would be similar to the Recommended Plan except an estimated 1,951 acres of swamp and BLH utilized by the bald eagle and colonial nesting waterbirds would be directly impacted and an estimated 56,679 acres of swamp and BLH would be indirectly impacted by the MaxW. Under the MinW scenario, direct and indirect impacts would be 1,712 acres and 56,679 acres, respectively. The implementation of Alternative D would have no effect on any listed species or their critical habitat, bald eagles or colonial nesting waterbirds.

4.3.5 Cultural and Historic Resources

Recommended Plan - Alternative C

Direct and Indirect Impacts: With a total footprint of 1,198 acres, the Recommended Plan has a chance to directly affect any recorded cultural resources or an unrecorded cultural resource that may exist within its footprint, or its borrow source or mitigation areas. Site 16SJB68 is located at the western end of the Recommended Plan, and would require further investigation as to whether it may be adversely affected by construction of the Recommended Plan. There are no other currently recorded cultural resources within the Recommended Plan footprint. A large portion of the Recommended Plan footprint has been surveyed via inclusion in cultural resource surveys for other purposes with no cultural resources recorded or expected. Regardless, portions of the Recommended Plan, especially those closest to waterways, do retain likelihood to contain unrecorded cultural resources that could be damaged by the construction of the Recommended Plan. Indirect impacts of the Recommended Plan would not be expected to be substantial. Known or unknown cultural resources on either side of the alignment could suffer indirect impacts via hurricane/tropical storm surge damage events. A Programmatic Agreement among the United States Army Corps of Engineers, the Louisiana State Historic Preservation Officer, and the Advisory Council on Historic Preservation was executed and can be found in Appendix A, Annex F. Compliance with this Programmatic Agreement will be achieved during preconstruction engineering and design (PED).

Alternative A

Direct and Indirect Impacts: Direct impacts would be similar to the Recommended Plan. Site 16SJB68 overlaps the western edge of Alignment A, and would require testing to determine if adverse impacts may occur to the resource by construction of Alternative A. There are no other currently recorded cultural resources within the Alternative A footprint. An alignment similar to Alignment A was surveyed for cultural resources in 2003 and found no cultural resources. Previously unsurveyed areas of Alignment A will need to be examined for potential cultural resources before construction.

Alternative D

Direct and Indirect Impacts: Direct impacts would be similar in nature to the Recommended Plan but potentially greater in extent as Alternative D has a footprint of 1,836 acres under the MaxW scenario and 1,611 acres under the MinW scenario, which increases the risk of both direct and indirect impacts to unknown cultural resources. Alternative D does not directly intersect any recorded and known cultural resources. There are cultural resources recorded in close proximity. Alternative D crosses many natural waterways considered high potential areas for cultural resources.

4.3.6 Aesthetics and Visual Resources

Recommended Plan - Alternative C

Direct Impacts: the Recommended Plan footprint is wider than Alternatives D MinW giving it a wider direct area of effect. Even with this wider footprint, direct impacts to visual resources would be minimal in residential and agricultural areas. Much of the levee system would be in areas that are screened by deep forest and swamp, or are remote and have minimal access. Residential areas near the levee construction may see increases in dust and noise levels during construction. This is a temporary impact and conditions should return to preconstruction levels after completion of the project. View sheds from I-10 may also be altered near the intersection with I-55 and further west where the proposed levee crosses under the interstate. Where once a natural landscape of water, marsh, or swamp could be seen, a green topped levee with a wide footprint and storm damage walls would now be seen. The proposed levee system intersects and crosses the Maurepas Swamp WMA boundaries. In those areas, access for recreation will be limited.

Indirect Impacts: The River Road Scenic Byway may see temporary impacts due to truck traffic and construction vehicles, but impacts would be minimal. Construction of the proposed levee system would most likely require a storm damage control gate or other structure across US-61. This could reduce the visual quality of the drive along the Byway. The affected area of wetlands south of the proposed levee system could be approximately

8,521acres which could change the landscape of the region due to water channel and drainage way closures or redirections.

Alternative A

Direct and Indirect Impacts: Direct impacts to the visual resources would be similar to those described under the Recommended Plan except the footprint of Alternative A is longer than that of the Recommended Plan. Indirect impacts to the visual resources would be similar to those described under the Recommended Plan. The affected wetlands would be much less than the Recommended Plan with only 3,654 acres of potential impacts.

Alternative D

Direct and Indirect Impacts: Direct and indirect impacts to resources would be similar to those for the Recommended Plan with the exception of the Blind River, a designated Wild and Scenic River, longer levee and potential impacts to 56,679 acres of wetlands.

4.3.7 Recreation Resources

Recommended Plan - Alternative C

Direct Impacts: Approximately four miles of the levee is within the Maurepas Swamp WMA. Depending on levee designs, the WMA may be less accessible by land and water to recreation users. The LDWF boat launches at the Hope Canal and Reserve Relief Canal, a swamp tour, the I-55 launch and the I-10 launch; and a recreational camp are on protect side of the levee alignment. Localized storm surge risk reduction measures impacts would not include effects on outdoor facilities such as golf courses, swimming pools, tennis courts, boat launches, playgrounds, or ball fields. Facilities that are raised would benefit from the added risk reduction. Boat access from the Reserve Relief Boat Launch via the Reserve Relief Canal to the Maurepas Swamp WMA would be temporarily blocked during construction. Post construction, access would be via a gate that would accommodate recreational use of the canal. Access impacts to Montz Canal, near the swamp tour would be mitigated through appropriate measure if necessary. The Hope Canal boat launch would be closed during construction and permanently relocated north of its current location along the Hope Canal and road access will be provided over the levee.

Indirect Impacts: Recreationists may have less access to Maurepas Swamp WMA during construction. People with recreational camps may not be able to access their camps temporarily. Access to Grand Point Canal Boat Launch via State Route 642 will remain available during and after polder construction.

Alternative A

Direct and Indirect Impacts: Direct impacts would be similar to the Recommended Plan with the following exceptions. The LDWF Hope Canal boat launch 0.2 mile north of Alternative A would not be impacted. There would be impacts to waterway access to the Hope Canal rather than the launch itself. The levee alignment crosses the access road to a recreational camp and would block access to it temporarily. Indirect impacts would be similar to the Recommended Plan.

Alternative D

Direct and Indirect Impacts: Direct impacts would be similar to the Recommended Plan except there would be an additional 16 miles of levee alignment impacts to the Maurepas Swamp WMA. This alternative would impact waterway access to the Hope Canal rather than the launch itself. Additionally, the alignment would block water access to the St. James Boat Club and the US-61 boat launch. Indirect impacts would be similar to the Recommended Plan.

4.3.8 Noise

Recommended Plan - Alternative C

Direct and Indirect Impacts: There would be temporary and localized increased noise levels related to construction. Most of the alignment is remote and unpopulated so noise would not affect any nearby communities. The area south of US-61 and in the general vicinity of the I-10/I-55 intersection is populated and may be impacted by construction noise. After construction, noise levels would return to pre-construction conditions. Construction equipment is limited in the level of noise that can be emitted. Institutional recognition of noise, such as the regulations for Occupational Noise Exposure (29 CFR §1910.95) under the Occupational Safety and Health Act of 1970, as amended, would continue. This mandates that noise levels emitted from construction equipment be below 90 dB for exposures of eight hours per day or more. Noise may cause some temporary and minor annoyance to residents adjacent to the proposed alignment south of US-61 and business customers and workers (e.g., Shell gasoline station and casino) near the intersection of I-10/I-55. However, the Occupational Noise Exposure (29 CFR §1910.95) under the Occupational Safety and Health Act of 1970, as amended, would continue. Local fish and wildlife species may relocate during construction. Noise effects are expected to be localized, temporary and minor. Administrative and/or engineering controls, determining and implementing appropriate buffer zones, and implementing construction activity windows, shall address these issues.

No permanent noise impacts would occur as a result of localized storm surge risk reduction measures and all noise emissions would be relatively short-term, lasting only as long as construction activities. The initial construction would be from 2016-2020 (4 years). The construction would also be phased starting in one location and moving to the next so the entire area would not be under construction at the same time. Table 4-2 presents noise emissions for construction equipment expected to be used during the construction activities. Anticipated sound levels at 50 ft would range from 76 dBA to 91 dBA based on data from the Federal Highway Administration (FHWA) (2007).

Table 4-2: Sensitive noise receptors within 1000 ft impacted from project construction

Project Construction	Noise Work Hours		Number of Sensitive Noise Receptors				
	Construction Contract Permissible Hours	Noise Ordinance - maximum permissible sound levels	Single-Family Homes	Apartment Buildings	Churches	Schools	Hospitals
Ascension Parish							
Maurepas Swamp Mitigation	10 hr/day, 6 days/week	6:00 am - 9:00 pm 65 dBA.	21	0	0	0	0
St Charles Parish							
Structural Features and Bonnet Carré mitigation area	10 hr/day, 6 days/week	7:00 am - 10:00 pm are 60 dBA for residential areas and 65 dBA for	0	0	0	0	0

Table 4-2: Sensitive noise receptors within 1000 ft impacted from project construction							
Project Construction	**Noise Work Hours**		**Number of Sensitive Noise Receptors**				
	Construction Contract Permissible Hours	**Noise Ordinance - maximum permissible sound levels**	**Single-Family Homes**	**Apartment Buildings**	**Churches**	**Schools**	**Hospitals**
		commercial areas.					
St. John the Baptist Parish							
Structural Features	10 hr/day, 6 days/week	7:00 am - 10:00 pm are 70 dBA for residential areas and 75 dBA for business & commercial areas.	197	5	0	0	0
St. James Parish							
	10 hr/day, 6 days/week	No specific ordinances regarding construction noise.	789	6	1	1	0
Livingston Parish							
Blind River Mitigation area	10 hr/day, 6 days/week	6:00 am - 11:00 pm 85 dBA for all areas.	4	0	0	0	0
Total			**1023**	**11**	**1**	**1**	**0**

The majority of the localized storm surge risk reduction system construction would not require the use of pile drivers or vibratory hammers, however it would use earth-moving construction equipment, which produces noise emissions of 81 dBA. The noise model projected that noise levels of 81 dBA were required to travel 300 ft before they attenuated to acceptable levels of 65 dBA. To achieve an attenuation of 81 dBA to a normally unacceptable level of 75 dBA, the distance from the noise source to the receptor was 100 ft.

A number of sensitive noise receptors were located within 1,000 ft of the construction sites. Aerial photography was used to determine the number of sensitive noise receptors within the 1,000 ft zones. Table 4-2 summarizes the total sensitive receptors with 1000 ft, segregated by parish that would be temporarily impacted during construction of the projects.

A number of parks and recreational areas are located near the projects, including the WMA, and these areas have the potential to experience increased noise emissions.

Impacts on the ambient noise environment resulting from the construction would be minor and short-term. Approximately, 697 single-family homes, 6 apartment buildings, 1 church and 1 school are located within 1,000 ft from the edge of the project corridors. These sensitive noise receptors could experience noise emissions greater than 65 dBA, which are normally unacceptable (HUD 1984). Construction work could occur as long as 10 hours a day, 6 days a week. However, no local noise ordinances would be exceeded. Administrative and/or engineering controls, determining and implementing appropriate buffer zones, and implementing construction activity windows, shall address these issues.

Alternative A

Direct and Indirect Impacts: Direct and, indirect impacts would be similar to the Recommended Plan except over a greater area because the alignment is closer to the developed area. Sixty-five additional homes would have minor and short-term impacts on ambient noise during construction. There is a potential for the background noise scape to change if pump stations are located near residential areas.

Alternative D

Direct and Indirect Impacts: Impacts would be similar to the Recommended Plan except there would be no impacts to residents south of the I-10 or US Highway 61; and there would be greater temporary and minor impacts to fish and wildlife resources along the longer alignment.

4.4 CUMULATIVE EFFECTS

Cumulative effects are defined in 40 CFR 1508.7 as those effects that result from:

> *...the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*

Cumulative environmental effects for the proposed project were assessed in accordance with guidance provided by the President's Council on Environmental Quality (CEQ).

4.4.1 Methodology

A six-step process was followed to assess cumulative effects on resources affected by the Updated Plan. The first step was to identify which resources to consider in this analysis. All impacts on affected resources can be called cumulative. However, according to CEQ guidance, "the role of the analyst is to narrow the focus of the cumulative effects analysis to important issues of national, regional, or local significance" (CEQ, 1997, p. 12).

The temporal boundaries for the assessment were established as follows:

- Past: Starting in the early 1800's the French and Spanish required riparian landowners to levee the river frontage of their lands, when logging decimated the cypress swamps, railroad corridor were construction. The Flood Control Act of 1928, when flood control projects of the Mississippi River and its tributaries were first authorized. Since that time, oil gas and mineral exploration and production measures such as pipelines, construction of I-10 and I-55, area levees and pump systems, drainage canals, and access canals have altered the hydrology of the project area.

- Present: 2020, when the construction impacts would begin.
- 2060, when construction of project features is expected to be completed.
- Future: 2020 to 2070.

The next steps of the cumulative effects analysis included:

- Defining the study area for each resource.
- Describing the historical context and existing condition of each resource. Descriptions of affected resources are summarized in more detail in Chapter 2.0 of this report.
- Summarizing the direct and indirect effects of the Action Alternatives on each identified resource. Environmental effects of the Action Alternatives are presented in more detail in sections 4.1 to 4.3 of this report.
- Identifying the accumulated effects on each resource from the Action Alternatives and other past, present, and reasonably foreseeable actions.
- Summarizing the magnitude of the cumulative effects of the projects and actions on the affected resources.

The information derived from these steps of the cumulative effect assessment is presented below for each resource. A summary of the cumulative effects analysis is provided in Table 4-3.

4.4.2 Study Area

The study area is defined in Section 1.1 of this report.

4.4.3 Past, Present, and Reasonably Foreseeable Future Actions

Descriptions of past, present, and reasonably foreseeable future projects related to the study area and the proposed project are located below in Table 4-3.

Table 4-3. Descriptions of past, present, and reasonably foreseeable future projects.

ID	Past/Present/Reasonably Foreseeable Future Action (RFFA)	Description
Local Drainage Improvements	Past/Present/RFFA	Parishes in the study area will continue to make improvements to their existing drainage systems. These actions may include dredging or clearing and snagging of drainage canals. In some areas, it may include enlarging drainage features, culverts, or pump stations for areas under forced drainage.
I-10 Improvements	Past/Present/RFFA	The LaDOTD, in conjunction with the Federal Highway Administration, continues to make improvements and repairs to the I-10/I-55 system. This would include minor improvements to address flooding and also in the future include an enhanced commercial interstate access into St. John the Baptist Parish, Louisiana.
Local Housing Developments	Past/Present/RFFA	Population and housing are expected to follow trends in the local, regional, and national economies. An increase of 33,000 residents and approximately 11,000 residential structures are projected in the study area over the course of the planning horizon.
Local Farming Activities	Past/Present/RFFA	Large areas of the WSLP study area are devoted to agriculture production such as sugarcane, soybeans, and a highly specialized crop called Perique tobacco. The main crop is sugarcane, but the acres planted between sugarcane and other crops vary each year based on the pricing demands.

ID	Past/Present/Reasonably Foreseeable Future Action (RFFA)	
Commercial and Industrial Developments (Expansion of chemical plants and port facilities)	Past/Present/RFFA	The study area and region includes numerous existing commercial and industrial facilities supporting the oil and gas infrastructure in Louisiana. Growth in business and industrial activity is expected to follow economic trends in the local, regional, and national economies.
Local Infrastructure Improvements	Past/Present/RFFA	The study area includes multiple power lines, pipelines and pipeline/power line right of ways. Historically, the supporting infrastructure has been expanded to support the growing commercial and industrial developments of the study area. Most of these expansions will be constructed within the existing right of ways or immediately adjacent to the existing right of ways in existing pipeline corridors.
Greater New Orleans Hurricane & Storm Damage Risk Reduction System	Past/Present/RFFA	The USACE, in conjunction with local non-federal partners, will continue to make improvements to the existing levee systems in the Pontchartrain Basin. This includes the construction of new levees/floodwalls or elevating existing levees or structures to address changes in the RSLR.
Mississippi River and Tributaries project (MR&T)	Past/Present/RFFA	The southern boundary of the WSLP study area is bound by the MR&T levee system. The levee is part of a comprehensive river management program authorized through the Flood Control Act of 1928. The levees were constructed by the Federal Government. Major maintenance is performed by the Federal Government, with minor maintenance being performed by the non-Federal Sponsor.. Periodic inspections of maintenance are conducted to ensure that the levees are maintained in good condition for their proper functioning in the flood control plan. Improvements are made to the system based on these inspections. This could consist of elevating existing levees or structures to address changing flow conditions.
Bonnet Carré Spillway	Past/Present/RFFA	The Bonnet Carré Spillway is the southernmost floodway in the MR&T system. Located in St. Charles Parish, Louisiana, the spillway reduces risk for New Orleans and other downstream communities during major floods on the Mississippi River. This risk reduction is accomplished by diverting a portion of the floodwaters into Lake Pontchartrain and then into the Gulf of Mexico, bypassing New Orleans. Outside of flood events, the spillway developed into an extensively used outdoor recreation area with approximately 400,000 visitors per year.
St. Charles Parish Hurricane Protection Levee Shoreline Enhancement and LaBranche Wetlands Restoration	Past/Present/RFFA	The project's overall objective is to protect northern St. Charles Parish by stabilizing the Lake Pontchartrain shoreline from further erosion, enhancing the shoreline where possible, and restoring the LaBranche Wetlands to provide an integrated system of multiple lines of defense.
Mississippi River Gulf Outlet (MRGO) Navigation Channel Closure	Present	Work included the construction of a rock closure structure across the MRGO channel at Bayou La Loutre. The project feature was then turned over to the Louisiana Coastal Protection and Restoration Authority for long-term operation, maintenance, repair, rehabilitation, and replacement responsibilities.

ID	Past/Present/Reasonably Foreseeable Future Action (RFFA)	Description
MRGO Ecosystem Restoration Plan Feasibility Study	Present/ RFFA	The purpose of the study is to restore the areas affected by the construction and operation of the MRGO channel through systematic ecosystem restoration efforts. The study considers several restoration measures to restore the ecosystem, including those that reduce or prevent damages from storm surge. At this time, there is no non-federal cost share sponsor.
Small Diversion at Convent/Blind River	RFFA	The objective of this diversion is to provide additional freshwater, nutrients and fine sediment from the Mississippi River into Maurepas Swamp and its surrounding areas. The project would be entirely within the WSLP study area
Amite River Diversion Canal Modification	RFFA	This project will construct gaps in the existing dredged material banks of the Amite River Diversion Canal to allow floodwaters to introduce additional nutrients and sediment into western Maurepas Swamp.
River Reintroduction into Maurepas Swamp (PO-29)	RFFA	The project would divert Mississippi River water to the Maurepas Swamp through Hope Canal. Construction of this project has transitioned for independent implementation by the State of Louisiana.
Amite River and Tributaries, Bayou Manchac Project	RFFA	The study area is located in southeastern Louisiana and encompasses portions of Ascension, Iberville, and East Baton Rouge Parishes. The proposed actions include several alternatives that would reduce the flood stages provide ecosystem restoration benefits as an ancillary benefit.
Bayou Conway & Panama Canal Drainage Improvement Project Ascension Parish and St. James Parish	RFFA	The purpose of the Bayou Conway and Panama Canal Drainage Improvement Project is to provide a reduction in the risk of flooding for the drainage basin that includes the area near the boundary between Ascension and St. James Parishes. The study determined the existing conditions within the basin based on varying downstream conditions and proposed necessary improvements to the channels to reduce the risk of flooding within the watershed. Currently, permits are being sought to begin the snagging and clearing of the channels to facilitate the drainage improvements. The next phase of work will be to begin the implementation of the proposed channel enlargement and improvements.
Laurel Ridge Levee Extension, Ascension Parish	RFFA	The Laurel Ridge Levee Extension Project consists of extending the existing Laurel Ridge Levee northward to protect additional properties along/within the Amite River floodplain from backwater flooding and high waters on the Amite River.

4.4.4 Existing Conditions

Existing conditions for each resource are described in Section 2.0, Affected Environment.

4.4.5 Direct, Indirect, and Cumulative Impacts

The cumulative effects on each of the resources considered and for each alternative are discussed in Table 4-4.

Table 4-4. Cumulative effects of key significant resources

Significant Resource	Past Actions (Historic Conditions)	Present Actions (Existing Conditions)	The No-Action Alternative (Future Without Project condition)	Cumulative Impacts Recommended Plan Alternative C	Cumulative Impacts Alternative A	Cumulative Impacts Alternative D
Hydrology– Flow and Water Levels	Louisiana (LA): Flows and water levels respond to and are impacted by natural conditions and man-made conditions. Study Area (SA): Decreased flows into and out of the swamp located within the SA due to construction of dredged material berms in connection with ARDC.	LA: Increased flows and water levels associated with increased runoff due to increasing urbanization and wetland loss. Rate of RSLR increasing over historic conditions. SA: Decreased flows into and out of the swamp due to dredged material berms along ARDC. Increased runoff due to increased urbanization of the Pontchartrain Basin.	LA: Increased flows and water levels associated with increase urbanization and associated runoff and increased wetland loss. Rate of RSLR increasing over historic conditions. SA: Decreased flows into and out of the swamp due to dredged material berms along ARDC. The State of Louisiana and Livingston Parish both have Coastal Impact Assistance Plan (CIAP) projects planned that would increase flows and sediment into the Maurepas swamp by breaching the berms along ARDC. Increased water levels due to continuation of coastal wetland loss, and increased runoff due to increased urbanization of the Pontchartrain Basin.	Cumulative impacts would include the incremental direct and indirect effects on flows and water levels attributable to the proposed action in addition to the direct and indirect impacts to flows and water levels attributable to other past, present, and reasonably foreseeable future actions including previous, existing and authorized levee systems in the Pontchartrain Basin, the state and the nation. Impacts associated with the Pontchartrain Basin levee systems, as reported in the USACE November 2012 preliminary report titled "Hurricane Isaac With and Without 100-year HSDRRS Evaluation" and the "Comprehensive Environmental Document, Phase I, Greater New Orleans HSDRRS", (USACE 2013) include impacts to flows and water levels associated with approximately 217 miles of levees systems within the existing New Orleans HSDRRS; approximately 1,115 acres of recently constructed portions of the West Bank and Vicinity HSDRRS system; additionally the 142-mile long MR&T levee system and the 18-mile long non-Federal levee from Caernarvon to White Ditch; as well as potential impacts of projects approved for construction. The state levee systems include approximately 3,122 miles of levee. Impacts associated with these levee systems are in addition to the increased flows and water levels associated with urban runoff from increased urbanization and increasing wetland loss arising from natural (i.e., SLR-related) and man-made conditions. Approximately 100,000 miles of levees exist throughout the nation (ASCE 2013). There would not be a significant cumulative change in water flows or levels due to impacts associated with this project since there are only minor effects due to this project.	Cumulative impacts associated with structural measures would be similar to those reported for the Recommended Plan, except impacts to protected-side wetlands would occur over a smaller area (6 square miles enclosed area as compared to 15 square miles under the Recommended Plan). Alternative A has the potential to increase flood stages in the immediate areas exterior to the levee.	Cumulative impacts would be similar to those reported in connection with the Recommended Plan except impacts to the protected side wetlands would occur over a significantly larger area (79 square mile enclosed area as compared to 15 square miles under the Recommended Plan). Alternative D would also have a higher potential to increase stages to communities located outside of and in the vicinity of the proposed levee alignment. This higher water level would be significant to the residents where induced flooding would occur but would not be significant on a state level.
Hydrology– Sedimentation and Erosion	LA & SA: Sediment delivery by crevasses ended after Flood Control Act of 1928. SA: Decreased redistribution of sediments into and out of the swamp due to dredged material berms associated with construction of ARDC which cut off the swamp from Amite River -- the primary source of sediments.	LA & SA: Inflow of suspended sediments by Mississippi River limited by construction of levees. SA: Decreased redistribution of sediments into and out of the swamp due to dredged material berms along ARDC.	LA: Sediment supply would not offset coastal land loss. Sediments would continue to be transported from terrestrial areas into Lakes Maurepas and Pontchartrain. SA: Storms cause some redistribution of sediments to and from the swamp and surrounding water, but the ARDC dredged material berm would continue to block exchange and therefore sedimentation. The swamp would continue to deteriorate due to this impoundment and lack of sediment supply. Natural and man-made levees would continue to subside and organic soils would not maintain elevations due to subsidence, decreased plant productivity, and wave erosion (USACE 2004). The State of Louisiana and Livingston Parish both have CIAP projects planned that would increase flows and sediment into the Maurepas swamp by breaching the berms along ARDC.	Cumulative impacts would include the incremental direct and indirect effects on hydrology as it relates to sedimentation and erosion attributable to both the construction of and operation of the proposed action (see Section 4.1.2) in addition to the direct and indirect impacts attributable to other past, present, and reasonably foreseeable future actions including previous, existing and authorized levee systems in the Pontchartrain Basin, the state and the nation. And the beneficial impact of the two proposed CIAP projects. This project would result in a significant reduction of erosion and sedimentation associated with storm events. The proposed action has the potential to decrease tidal interchange velocities throughout the area resulting in increased sedimentation within waterways of both the interior and exterior of the proposed levee alignment. There would not be a significant cumulative change in sedimentation and erosion due to this project.	Impacts would be similar to the Recommended Plan except over a smaller area.	Impacts would be similar to the Recommended Plan except they would occur over a larger area. These impacts would not rise to the level of significant.

Table 4-4. Cumulative effects of key significant resources

Significant Resource	Past Actions (Historic Conditions)	Present Actions (Existing Conditions)	The No-Action Alternative (Future Without Project condition)	Cumulative Impacts Recommended Plan Alternative C	Cumulative Impacts Alternative A	Cumulative Impacts Alternative D
Water Quality and Salinity	LA & SA: Clean Water Act of 1977, NEPA of 1969, Coastal Zone Management Act, and Estuary Protection Act and institutional recognition to restore and protect water bodies, especially with respect to point sources. Non-point sources still unregulated. LA: Increase in salinity levels inland due to salt water intrusion, due in part to wetlands loss. SA: Human developments along the ARDC, Amite and Blind Rivers and on ridges begin to adversely impact water quality. The ARDC northeast of Sorrento is listed as impaired for mercury. Construction of ARDC results in impounding storm driven higher salinity waters within SA and causes it to absorb into the substrate resulting in degradation of freshwater swamp ecosystem.	LA & SA: Continued institutional recognition. Increasing human populations, agriculture and industrialization result in increased potential for water quality problems. LA: Increase in salinity levels inland due to salt water intrusion from wetlands loss and reduction in freshwater inflow. SA: Human developments result in wastewater and polluted runoff from nearby urban areas; continued conversion of swamp habitat to marsh and open water reduces natural filtration of water. Continued impounding of higher salinity waters causing it to absorb into the substrate resulting in degradation of freshwater swamp ecosystem. Recent closure of MRGO has reduced Salt water entering Lake Ponchartrain.	LA & SA: Continued institutional recognition. Federal and state water quality programs – may address land use practices in the Mississippi River basin and could impact the area water quality. Increasing human populations and industrialization result in increased potential for water quality problems. LA: Increase in salinity levels inland due to salt water intrusion from wetlands loss and reductions in freshwater inflow. Salinities may also increase due to impacts from relative sea level rise. SA: Conversion of 18,204 acres of swamp to marsh and open water reduces natural filtration of water by swamp vegetation; continued discharge of untreated stormwater runoff from nearby populated areas. Continued impoundment and lack of hydrologic connections result in longer residence time of higher salinity water resulting in absorption of salinity into swamp soils continuing the degradation of freshwater swamp and BLH vegetation. But lower salinity trends in Lake Ponchartrain may reduce this effect.	LA & SA: There exists a continued institutional recognition while at the same time increasing human populations and industrialization that increase the potential for water quality problems. LA: Increase in salinity levels inland due to salt water intrusion from wetlands loss and reductions in freshwater inflow. Salinities may also increase due to impacts from RSLR. Cumulative impacts would be the incremental direct and indirect impacts to water quality and salinity of implementing and operating the proposed Recommended Plan in addition to the direct and indirect impacts attributable to other past, present, and reasonably foreseeable future actions including other existing and authorized levee systems in the Pontchartrain Basin, the state and the nation. The proposed project, combined with other projects and activities in the area could cumulatively impact water quality. Additionally, the combination of the proposed project and the planned diversion projects in the study area could complicate water quality and hydrology, particularly for the protected side of the proposed alignment, leading to changes in wetlands biogeochemistry and water quality function. The continued freshening trend in Lake Pontchartrain would reduce the chance for any negative salinity effects of this project during periods that the system is open. During storm events salinity driven by the surge would be prevented from entering the system. There would not be a significant cumulative change in water quality or salinity due to the addition of this project.	Water quality impacts would be expected to be similar in nature, but less than impacts associated with the Recommended Plan due to the fewer enclosed wetlands.	Water quality impacts associated with this alternative would be expected to be similar in nature but greater than impacts associated with the Recommended Plan.
Socioeconomic and Human Resources – Population and Housing	LA: Hurricanes Katrina and Rita adversely affected populations throughout the state. SA: Development along the ARDC, Amite and Blind Rivers and on ridges. Populations within Ascension and Livingston Parishes increasing.	LA: Slight decrease (-3.9%) in population from 2000-2007. SA: Development along the ARDC, Amite and Blind Rivers and on ridges. Populations within Ascension and Livingston Parishes have been increasing. Population increases between 2000 and 2010 are likely the result of population influx after Hurricane Katrina (2005). The three parish total population in 2010 was 120,806 residents. The 2012 population in the three parishes declined to 119,161 (U.S. Census 2013) due mainly to Hurricane Isaac impacts.	LA: Increasing populations in Louisiana. SA: An increase of 33,000 residents and approximately 11,000 residential structures are projected. In the absence of storm surge damage risk management measures population and housing could be adversely affected.	LA: Increasing populations worldwide. Populations and housing within the SA would continue to increase. Storm surge damage risk management measures would benefit population and housing. There would not be a significant cumulative change in population and housing on the state level. There may be some adjustment in location in housing to be in the protected area. Housing outside would be built at a higher elevation.	Impacts would be the same as the Recommended Plan.	Impacts would be the similar to the Recommended Plan except there would be fewer new homes elevated.

Table 4-4. Cumulative effects of key significant resources

Significant Resource	Past Actions (Historic Conditions)	Present Actions (Existing Conditions)	The No-Action Alternative (Future Without Project condition)	Cumulative Impacts Recommended Plan Alternative C	Cumulative Impacts Alternative A	Cumulative Impacts Alternative D
Socioeconomic and Human Resources - Employment, Business and Industrial Activity (including Agriculture)	LA: Slight increase in employment in Louisiana. Hurricanes Katrina and Rita had an adverse effect on employment and personal income. Rebuilding efforts provide some new job opportunities. Increasing population growth and supporting infrastructure in the form of roads, bridges, pipelines, homes, and businesses. Agriculture is important to the economy of the US and coastal Louisiana. Important crops include sugar cane, rice, and soybeans. SA: Total employment in SA increasing. Businesses are generally retail stores and restaurants. Approximately 10 percent of the area (23,800 acres) is devoted to agriculture, and about half of these acres are sugar cane crops	LA: Increasing population growth and employment and personal income opportunities. Economic activity related to wetland resources would be adversely affected by the depletion of these resources. Increasing population growth and supporting businesses and industry development contributes to degradation and loss of coastal and other wetlands. SA: Businesses are generally retail stores and restaurants. Agriculture is important to the economy of the US and coastal Louisiana. Important crops include sugar cane, rice, and soybeans. Development along the ARDC, Amite and Blind Rivers and on ridges as well as conversion of farmland. Employment and income resources are primarily retail, eating and drinking establishments. Total employment in SA increasing.	LA: Increasing population growth and employment and personal income opportunities. Economic activity related to wetland resources would be adversely affected by the depletion of these resources. Degradation and loss of wetlands would contribute to potential losses of businesses. Agriculture would continue to be important to the economy of the US and coastal Louisiana. SA: Total employment in SA expected to increase. Wetland land loss would potentially threaten businesses in the study area. Agricultural lands, primarily livestock pastures, within the study area would continue to be used and may be adversely impacted by habitat conversion and land loss. There would be a potential for the temporary interruption or permanent displacement of employment, business, and industrial activity as businesses temporarily or permanently relocate to areas with less storm damage risk.	LA: Increasing human populations lead to competition for employment and income. Economic activity related to wetland resources would be adversely affected by the depletion of these resources. Continued population growth and supporting business and industry development contributes to degradation and loss of coastal and other wetlands, which contributes to potential loss of businesses. Continued importance of agriculture to the economy of the US and coastal Louisiana. Agricultural lands may be adversely impacted by habitat conversion and land loss. There may be some adjustment in location of business and industry in order to be located in the protected area. New Business and industry would be built at a higher elevation or with flood proofing as part of the design. There would not, however, be a significant cumulative change in resource on the state level.	Cumulative impacts would be the same as those reported in connection with the Recommended Plan.	Cumulative impacts would be similar to those reported in connection with the Recommended Plan except all three parishes would be located behind the levee alignment allowing for continued operation of businesses, industries and agriculture in St. James Parish during a minor storm surge events.
Socioeconomic and Human Resources– Public Facilities and Services	LA: Increasing population growth increases public facilities and services issues. SA: Public facilities and services generally serve residents and recreational visitors.	LA: Increasing population growth increases public facilities and services issues. SA: Public facilities and services generally serve residents and recreational visitors. A total of 402 public and quasi-public buildings were in the three-parish area in 2012.	LA: Increasing population growth increases public facilities and services issues. SA: Wetland land loss potentially threatens public facilities and services and increases maintenance. Several of the current subdivisions would expand, creating additional needs for public facilities and services. An additional 165 such facilities are projected by 2070.	LA: Continued population growth increases public facilities and services issues. There may be some adjustment in location of these facilities to be in the protected area. New public facilities outside the levees would be built at a higher elevation or with flood proofing as part of the design. There would not be a significant cumulative change in resource on the state level.	Impacts would be the same as the Recommended Plan.	Facilities would not need to relocate in order to be behind the levee nor would they be built at a higher elevation with flood proofing as part of the design as all three parishes are located behind the levee under Alternative D .
Socioeconomic and Human Resources– Traffic and Transportation	LA: Increasing population growth increases traffic and transportation issues. SA: State and local roads traverse the study area. Traffic is generally confined to residents and recreational visitors.	LA: Increasing population growth increases traffic and transportation issues. SA: State and local roads traverse the study area. Traffic is generally confined to residents and recreational visitors.	LA: Continued population growth increases traffic and transportation issues SA: Several of the current subdivisions would expand, creating additional roads, bridges, and traffic.	LA: Continued population growth increases traffic and transportation issues. There would not be a significant cumulative change in traffic and transportation on a state level.	Impacts would be the same as the Recommended Plan.	Impacts would be similar to the Recommended Plan, except storm surge risk reduction to the transportation infrastructure would extend into the western portion of the project area.

Table 4-4. Cumulative effects of key significant resources						
Significant Resource	**Past Actions (Historic Conditions)**	**Present Actions (Existing Conditions)**	**The No-Action Alternative (Future Without Project condition)**	**Cumulative Impacts Recommended Plan Alternative C**	**Cumulative Impacts Alternative A**	**Cumulative Impacts Alternative D**
Socioeconomic and Human Resources– Community and Regional Growth	LA & SA: Increasing population growth increases community and regional growth.	LA & SA: Increasing population growth increases community and regional growth.	LA: Increasing population growth increases community and regional growth. SA: Additional increases in community and regional growth would be sustained through the filling of lots in the existing and proposed subdivisions. Higher potential for less community and regional growth due to increasing risk of damage from hurricane/tropical storm surge events	LA: Continued population growth increases community and regional growth. There would not be a significant cumulative change in community and regional growth. The location of that growth could be concentrated in areas of higher protection.	Impacts would be the same as the Recommended Plan.	Impacts would be similar to the Recommended Plan, except localized storm surge risk reduction measures would not be necessary in the Gramercy/Lutcher area.
Socioeconomic and Human Resources– Tax Revenue and Property Values	LA & SA: Increasing population growth increases tax revenue and property values.	LA & SA: Increasing population growth increases tax revenue and property values.	LA: Increasing population growth increases tax revenue and property values. SA: Additional increases in property values and tax revenues would be sustained through the filling of lots in the existing and proposed subdivisions. However, without storm surge damage risk reduction measures, the economic stability, tax revenues and property values could be adversely affected.	LA: Continued population growth increases tax revenue and property values. There would not be a significant cumulative change in tax revenues and property values. The location of that growth could be concentrated in areas of higher protection.	Impacts would be the same as the Recommended Plan.	Impacts would be the same as the Recommended Plan.
Socioeconomic and Human Resources– Community Cohesion	LA & SA: Community cohesion is affected by infrastructure development and community development. LA: Hurricanes Katrina and Rita adversely affected community cohesion in southern portions of the state. SA: The SA is populated along the Mississippi River, ARDC, Amite and Blind Rivers, and on ridges.	LA & SA: Community cohesion is affected by infrastructure development and community development. LA: Hurricanes Katrina and Rita adversely affected community cohesion in southern portions of the state.	LA & SA: Community cohesion would continue to be affected by infrastructure development and community development. SA: Several of the current subdivisions would expand. The increased risk of damage to residential and non-residential structures and the resulting temporary and/or permanent relocation of populations would negatively affect the community cohesion in many communities. Community cohesion may be reduced if residents and businesses relocate to lower-risk areas.	LA: Increasing populations worldwide. Increasing opportunity for infrastructure development and community cohesion development. There would not be a significant cumulative change in community cohesion; this alternative would help to maintain the existing level. Some communities may be affected by residents and businesses relocate to lower-risk areas. There are no adverse cumulative impacts to the Human Environment resources; there are positive cumulative effects for community sustainability and resiliency that accrue to the metropolitan area as a whole attributable to an expansion of a regional flood risk reduction system.	Impacts would be the same as the Recommended Plan.	Impacts would be similar to the Recommended Plan. There would be less movement of residents and businesses.

Table 4-4. Cumulative effects of key significant resources						
Significant Resource	**Past Actions (Historic Conditions)**	**Present Actions (Existing Conditions)**	**The No-Action Alternative (Future Without Project condition)**	**Cumulative Impacts Recommended Plan Alternative C**	**Cumulative Impacts Alternative A**	**Cumulative Impacts Alternative D**
Socioeconomic and Human Resources – Environmental Justice	US: Institutional recognition via Executive Order 12898. LA: Hurricanes Katrina and Rita adversely affected Environmental Justice resources in the state. SA: St. James and St. John the Baptist Parishes have majority minority populations. The communities of Lutcher and Convent (in St. James Parish), and Reserve, Laplace and Garyville (in St. John the Baptist Parish) were identified as having majority minority populations, and therefore are identified as areas of potential EJ concerns.	LA: Continued institutional recognition; increasing Environmental Justice resources as a result of increase in population and decrease in economic output from 2000-2009. SA: Environmental Justice resources within study area appear stable.	LA: Continued institutional recognition; potential increase in Environmental Justice resources as a result of continued economic recession. SA: There may be further construction and an increase in the population. Environmental Justice resources may increase; these resources would likely remain unchanged. People living and working in the area, irrespective of race or income, would be impacted by storm surge events in the future without project condition.	LA: Increasing populations worldwide. Increasing opportunity for the development of minority communities and the expansion of low-income populations worldwide. Assessment of cumulative impacts would include an assessment of any historical storm impacts to low lying elevations and communities in the project area as well as any measures or projects constructed by local, county, and State agencies as a result of past storm events. Past construction efforts may need to be reassessed at the local, parish or state level after construction of the proposed action. Cumulative impacts would include the incremental direct and indirect impacts of implementing storm damage risk reduction measures in the area plus the direct and indirect impacts on minority and low income populations from other activates in the area including hurricane storm damage risk management projects within the Pontchartrain Basin. Potential construction impacts resulting from the proposed action would be temporary in nature and would impact all communities regardless of race or poverty level, equally. Specific construction impacts such as air quality are discussed in this document and appropriate guidelines will be implemented to reduce impacts to all residents. These and future activities would provide communities in the vicinity with increased flood risk reduction benefits regardless of race or income level. There would be no cumulative environmental justice-related impacts.	Impacts would be the same as the Recommended Plan.	Impacts would be the same as the Recommended Plan.
Soil and Waterbottoms-Soils, Water Bottoms and Prime and Unique Farmlands	LA: Louisiana coastal land loss of over 1.22 million acres since 1956. SA: Loss of 1,600 acres in Amite/Blind River mapping unit between 1932 and 1990 (LCWCRTF and WCRA, 1999). LA & SA: Water bottoms develop in response to natural and man-made conditions. Approximately 44,672 acres, or 24.2 percent, of the study area meet the soil requirements for prime farmland (NRCS 2013).	LA: Continued land loss of over 25 square miles per year increasing the acreage of shallow open water and water bottoms. SA: Continued land loss due to natural and human-induced causes. Barbary, Fausse, and Maurepas soils are primarily affected. Prime farmlands could be converted to other uses.	SA: Shoreline erosion and land loss persist resulting in the loss of soil resources. Over 50-year period of analysis; projected conversion of 18,204 acres of swamp soils to fresh marsh and open water. Barbary, Fausse, and Maurepas soils would primarily be affected. Prime farmlands could be converted to other uses, including new development.	LA: Continued institutional recognition and programs for soil conservation to reduce soil losses. Increased acreage of shallow water bottoms in response to wetland loss SA: There would be adverse cumulative impacts from the non-structural plan to soils, water bottoms, and prime and unique farmlands, urban growth and natural processes would also continue to contribute to impacts to soils and water bottoms and to the loss of prime and unique farmlands. 1,176 acres of direct impacts and up to 8,432 acres of minor indirect impacts on soil resources and water bottoms; about 128.2 acres of farmlands converted to non-agricultural use. The water bottoms are part of the unavoidable impacts and will be mitigated for through compensatory mitigation measures. There would not be a significant cumulative change in these resources due to the construction of this project.	Impacts would be the same as the Recommended Plan with the following exceptions: there would be an incremental total of about 1,338 acres of direct impacts and up to 3,564 acres of indirect impacts on soil resources and water bottoms; about 53.4 acres of farmlands converted to non-agricultural use.	Cumulative impacts would be similar to the Recommended Plan with the following exceptions: incremental direct impacts of approximately 1,115 acres of soil resources and 17.5 acres of water bottoms.

Table 4-4. Cumulative effects of key significant resources

Significant Resource	Past Actions (Historic Conditions)	Present Actions (Existing Conditions)	The No-Action Alternative (Future Without Project condition)	Cumulative Impacts Recommended Plan Alternative C	Cumulative Impacts Alternative A	Cumulative Impacts Alternative D
Vegetation	LA & SA: Natural processes form coastal vegetation resources. SA: Upland habitat is primarily limited to the agricultural, while wetlands in the area are primarily BLH and swamp. Since 1932, more than 66,000 acres of wetlands have converted to water in the Pontchartrain Basin--over 22 percent of the marsh that existed in 1932 (source: The Pontchartrain Basin accessed March 28, 2014). Louisiana's 3 million acres of wetlands are lost at the rate of about 75 square kilometers annually (http://pubs.usgs.gov/fs/la-wetlands/ accessed March 25, 2014. According to the USGS (http://www.npwrc.usgs.gov/resource/wetlands/uswetlan/century.htm accessed March 28, 2014) natural wetlands of this country are estimated at 127 million acres.	LA & SA: Deterioration and loss of wetlands over 25 square miles per year.	LA & SA: Continued deterioration and loss of vegetated acreage due to natural and human-induced processes. SA: The swamp would convert to freshwater marsh, which in turn would convert to open water. Undeveloped vegetated lands, including wetlands, would continue to be lost to development.	LA: Continued deterioration and loss of vegetated wetland habitat due to natural and human-induced processes. The primary vegetation impacts from this project would be the direct and indirect impacts of implementing and operating the Recommended Plan on wetlands. (See Section 4.3.2 for a detailed discussion of these impacts). The project would be designed to mitigate for these impacts thereby reducing them to the greatest extent practicable. Unavoidable impacts will be mitigated for through compensatory mitigation measures. As such, any incremental direct and indirect impacts of implementing the Recommended Plan when added to the direct and indirect impacts attributable to other past, present, and reasonably foreseeable future actions including other existing and authorized levee systems in the Pontchartrain Basin, the state and the nation would not result in a significant cumulative change in these resources.	Cumulative impacts would be similar to those reported in connection with the Recommended Plan, but with less mitigation requirements.	Cumulative impacts would be similar to those reported in connection with the Recommended Plan, but with greater mitigation requirements.
Wildlife Resources	LA & SA: Wetland dependent wildlife populations respond primarily to natural population-regulating mechanisms. SA: The bald eagle was removed from the endangered species list in 2007. The Southeast United States Regional Waterbird Conservation Plan was completed in 2006.	LA & SA: Continued nationwide degradation and loss of wetlands leads to decline of wetland-dependent wildlife populations. SA: Continued swamp degradation and conversion to marsh and open water leads to increased competition between local wetland-dependent wildlife populations, displacement to other more suitable swamp wetland areas, and localized decline in wetland-dependent wildlife population. Bald eagle populations in the area are steady. Habitats for wading birds in the area are declining due to swamp degradation.	LA and SA: Nationwide degradation and loss of swamp habitat continues to adversely impact wetland-dependent wildlife populations. SA: Conversion of swamp vegetation to fresh marsh and open water habitat results in continued decline in quality of and availability of swamp wildlife habitat. Conversion of swamp to open water will adversely affect populations of bald eagle and colonial nesting wading birds due to decreased nesting habitat and decreased food availability.	Continued nationwide loss of vegetated wetlands continues to adversely impact wetland-dependent wildlife populations. The potential direct and indirect impact to vegetated wetlands represents the primary wildlife-related impact associated with the Recommended Plan. Because the project would be designed to mitigate for these impacts and because unavoidable impacts will be mitigated for through compensatory mitigation measures, any incremental direct and indirect impacts to wildlife resources associated with implementing the Recommended Plan, when added to the direct and indirect impacts attributable to other past, present, and reasonably foreseeable future actions in the Pontchartrain Basin, the state and the nation, would not result in a significant cumulative change in these resources.	Cumulative impacts would be similar to those reported in connection with the Recommended Plan, but with less mitigation requirements.	Cumulative impacts would be similar to those reported in connection with the Recommended Plan but with greater mitigation requirements.

Table 4-4. Cumulative effects of key significant resources						
Significant Resource	**Past Actions (Historic Conditions)**	**Present Actions (Existing Conditions)**	**The No-Action Alternative (Future Without Project condition)**	**Cumulative Impacts Recommended Plan Alternative C**	**Cumulative Impacts Alternative A**	**Cumulative Impacts Alternative D**
Aquatic and Fishery Resources	LA: Reduction in fisheries habitat, increased catches, gear improvement, catch regulations, Magnuson-Stevens Fishery Conservation and Management Act and amendments, formation of NMFS and LDWF. About 90% of the world's seafood resources have been depleted in the past century; 38% of the depleted species have declined by more than 90%; 7% of the species of fish studied by researchers have become extinct (Worm et al., 2006).	LA: Aquatic and fisheries populations in LA are shifting towards more saline-oriented species as land loss and saltwater intrusion into interior regions continues. SA: There are aquatic and fisheries species changes associated with conversion of swamp habitat to freshwater marsh and open water.	LA: Aquatic and fisheries populations in LA are shifting towards more saline-oriented species as land loss and saltwater intrusion into interior regions continues. LA & SA: Conversion of swamp to fresh marsh and open water may shift populations, but there are no direct adverse impacts.	LA: Continued institutional recognition. Continued nationwide loss of vegetated wetlands continues to adversely impact aquatic species. Aquatic organism access into and out of the proposed action area would be impacted; additional culverts may deter some species from swimming through those structures. This impact would be most significant for the catadromous American eel that needs the fresh water areas for development and access to the ocean for breeding. If the closures occur, when the elvers stage enter the swamps there would be a recruitment age class loss. Aquatic habitat that is affected by this project is being mitigated for. All this mitigation will occur on the flood side of the levee. As such, any incremental direct and indirect impacts to aquatic and fisheries resources associated with implementing the Recommended Plan, when added to the direct and indirect impacts attributable to other past, present, and reasonably foreseeable future actions in the Pontchartrain Basin, the state and the nation, would not result in a significant cumulative change in these resources.	Cumulative impacts would be similar to those reported in connection with the Recommended Plan.	Cumulative impacts would be similar to those reported in connection with the Recommended Plan.
Essential Fish Habitat (EFH)	US and LA: General decrease in quality of EFH beginning in the mid-1990s. Institutional recognition of decline in EFH quality; passage of Magnuson-Stevens Fishery Conservation and Management Act, as amended. SA: Blind River and various bayous and canals in the Maurepas Swamp provide EFH.	US and LA: Continued institutional recognition; continued wetland loss and decline in quality of EFH. SA: Blind River and various bayous and canals in the Maurepas Swamp provide EFH.	US and LA: Continued institutional recognition; continued wetland loss and decline in quality of EFH. SA: Blind River and various bayous and canals in the Maurepas Swamp provide EFH.	US and LA: Continued institutional recognition; continued wetland loss and decline in quality of EFH. There is no EFH in the levee alignment or the area enclosed by the levee. Therefore there is no cumulative effect on EFH due to this project at this time.	Same as the Recommended Plan.	This Alternative does directly and indirectly impact EFH. Because the structure is being designed to minimize any such impacts, however, these impacts would not cause a significant cumulative impact in EFH.
Threatened and Endangered Species	LA & SA: Institutional recognition of importance of wetlands decline in listed species via the Endangered Species Act (ESA). Decrease in some animal and plant populations and their critical habitat including loss of wetlands.	LA & SA: Continued institutional recognition of decline in listed species; continued loss of wetlands that are critical habitat to many listed species. SA: Degradation and loss of important fish and wildlife habitats for shelter, nesting, feeding, roosting, cover, nursery, and other life requirements.	LA & SA: Continued institutional recognition of decline in listed species; continued loss of wetlands. SA: Conversion of 18,204 acres of swamp habitat to fragmented and degraded fresh marsh and open water habitats; any listed species that may be presently utilizing the habitats would likely not be impacted.	US and LA: Continued institutional recognition of decline in listed species; continued loss of wetlands. Based on review of existing data and preliminary field surveys, the USACE finds that implementation of the proposed action would have no effects on any known listed species or their critical habitat. Gulf sturgeon and the West Indian Manatee would be temporarily restricted from entering the proposed action area on average about 8.5 days per year due to closing gates and culverts in preparation for storm surge events. Therefore there is no cumulative effect on T&E species due to this project.	Same as the Recommended Plan.	Same as the Recommended Plan.
Cultural and Historic Resources	US, LA, & SA: Institutional recognition via the National Historic Preservation Act (and others). Historic and cultural resources subjected to natural processes and man-made actions.	US, LA, & SA: Continued institutional recognition. Human activities as well as natural processes can potentially destroy historic and natural resources. The loss of land threatens the existence and integrity of these resources.	US, LA, & SA: Continued institutional recognition. Potential loss of resources due to natural and human causes. SA: The loss of land within the SA threatens the existence and integrity of resources that may exist within the SA.	US & LA: Potential loss of resources due to natural and human causes. SA: the Recommended Plan has a chance to directly and indirectly affect any recorded or unrecorded cultural resource that may exist within the footprint of the project, the project's borrow source or the project's mitigation areas, or within any area identified as an area of potential effects (APE). A programmatic agreement (PA) is in place to govern future investigations and activities. In accordance with the PA, to the extent any adverse effect to identified cultural resources cannot be avoided, such impacts will be mitigated.	Cumulative impacts would be similar to those reported in connection with the Recommended Plan.	Given the longer levee alignment, there is an increased risk of discovery of unrecorded cultural resources. Cumulative impacts would be similar to those reported in connection with the Recommended Plan.

Table 4-4. Cumulative effects of key significant resources

Significant Resource	Past Actions (Historic Conditions)	Present Actions (Existing Conditions)	The No-Action Alternative (Future Without Project condition)	Cumulative Impacts Recommended Plan Alternative C	Cumulative Impacts Alternative A	Cumulative Impacts Alternative D
Aesthetics	US, LA, & SA: Technical recognition via 1988 USACE Visual Resources Assessment Procedure. Institutional recognition via Wild and Scenic Rivers Act, Louisiana Scenic Rivers Act, Scenic Byways and others. LA & SA: Aesthetic resources negatively impacted by hurricanes Katrina, Rita, Gustav, and Ike. Blind River is a designated Scenic River.	US, LA, & SA: Continued institutional recognition. Visual resources have been destroyed, enhanced, or preserved by human activities and natural processes. LA & SA: Continued wetland loss may have an adverse effect on the visual complexity of the bayous and swamps.	US, LA, & SA: Continued institutional recognition. Continued human population growth and development and other human activities have the potential to destroy, enhance or preserve visual resources. SA: Erosion and land loss could result in the loss of vegetation that may provide a visually complex environment and desirable views and reduce opportunities for viewing wildlife.	US & LA: Continued human population growth and development and other human activities have the potential to destroy, enhance or preserve visual resources. Hydrologic units and drainage throughout the area of effect would be changed due to the introduction or enlargement of a large levee system to the area. Existing canals and channels would not be altered and only closed on a limited basis, there by not changing water flows or altering the landscape. There would be no significant cumulative effect due to this project	The cumulative impacts to resources would be similar to those for the Recommended Plan with the exception of the longer levee.	The cumulative impacts to resources would be similar to those for the Recommended Plan with the exception of the Blind River, a designated Wild and Scenic River, and the longer levee.
Recreational	LA & SA: Recreational resources not an issue. Institutional recognition via Federal Water Project Recreation Act, Land and Water Conservation Act, and National Wildlife Refuge System Acts. SA: Recreation activities in SA centered on natural resources. A portion of Maurepas Swamp WMA is present.	LA: Continued institutional recognition. Increased recreational activities impact national and state wetlands. SA: Recreation activities centered on natural resources. Continued conversion of marsh and swamp to open water resulting in decreasing recreational opportunities.	LA & SA: Continued institutional recognition. Potential loss of recreational resource base due to continued swamp and freshwater marsh degradation and loss. Recreational infrastructure would remain vulnerable to surges. Parks, boat launches, and golf courses could be damaged.	LA: Continued loss of recreational resource base due to continuing coastal and wetland degradation and loss. SA: Area diversion projects (LCA CBRD and the Maurepas Diversions) would provide fresh water and improve wetlands. The WSLP project could decrease salt water intrusion resulting from hurricane/tropical storm surge events, which would improve fish and wildlife habitat and increase opportunities for fresh water fishing and hunting. As levees are built, recreational access through canals and bayous would decrease, but recreational infrastructure would realize a reduction in risk of damage from hurricane/tropical storm surge events. There would be no significant impact to recreation with the addition of this project.	Cumulative impacts would be similar to the Recommended Plan.	Cumulative impacts would be similar to the Recommended Plan; however this alternative would limit recreational access to the Maurepas Swamp WMA to a greater extent because of the greater length of the alignment. .
Noise	LA & SA: Institutional recognition via Noise Control Act of 1972. SA: Noise pollution sources are development along the ARDC, Amite, and Blind Rivers, on ridges, and boat traffic on ARDC, Amite and Blind Rivers. Noise is not yet an issue. Near developed areas, automobile and train traffic, and to a lesser extent air traffic, contribute to the background noise levels.	LA and SA: Continued institutional recognition; continued human population growth and development cause some noise pollution. SA: Ambient noise from boats and airboats on ARDC, Amite and Blind Rivers, and other human activities may cause some minimal and temporary disturbances.	LA and SA: Continued institutional recognition; continued human population growth and development would cause some noise pollution. SA: Ambient noise from boats and airboats on ARDC, Amite and Blind Rivers, and other human activities continue to cause some minimal and temporary disturbances.	LA: Continued institutional recognition; continued human population growth and development would cause some noise pollution. Any cumulative impacts would be temporary and minor in nature. Therefore there would be no significant cumulative impact to noise due to the addition of this project.	Cumulative impacts would be similar to the Recommended Plan.	Cumulative impacts would be similar to the Recommended Plan except there would be no impacts to residents south of the I-10 or US Highway 61; and there would be greater temporary and minor impacts to fish and wildlife resources along the longer alignment.

*Includes Spatial/Geographic Extent (Continental United States [US], Louisiana [LA], and Study Area [SA], and Temporal (Past, Present, and Future with the No-Action Alternative). This cumulative impact analysis follows the 11-step process described in the 1997 report by the Council on Environmental Quality entitled "Considering Cumulative Effect Under the National Environmental Policy Act".

4.5 Mitigation Requirements Associated with the Recommended Plan

Mitigation planning is an integral part of the planning process. Measures to avoid and minimize impacts to significant resources were employed to the extent practicable. Nonetheless, unavoidable project-induced impacts to bottomland hardwood and swamp habitat would occur and would be offset through compensatory mitigation. A mitigation plan was further developed in the feasibility level design of the recommended plan. The mitigation plan objective is to restore swamp and BLH habitat to fully compensate for project-related impacts. WVA models were run on the recommended plan to determine the functions and values of impacted habitats. These results are expressed in AAHUs in Table 4-5. The models predict that approximately 1,189 AAHUs would be lost due to direct and indirect impacts over the 50-year period of analysis. This impact set the mitigation requirement that must be delivered by the mitigation plan. Table 4-6 lists the mitigation measures to compensate for the impacts. These measures are the result of Cost Effectiveness and Incremental Cost Analyses which can be found in Appendix A, Annex S. For more details on the Mitigation plan see Appendix A, Annex K. Impacts related to resources mitigation actions are described below. All mitigation areas of WSLP are being coordinated for Section 106 compliance via a Programmatic Agreement. Compliance with the Section 106 Programmatic Agreement will be achieved during PED.

Table 4-5: Impacts to swamp and BLH

Habitat	Direct Impacts		Indirect Impacts		Total Impacts[7]	
	Acres	AAHU	Acres	AAHU	Acres	AAHU
Swamp[8]	1,112	595	8,432	495	9,545	1,090
Bottomland Hardwood	124	96	89	3	213	99
Total	*1,236*	*691*	*8,521*	*498*	*9757*	*1,189*

Table 4-6: Restored swamp and BLH

Mitigation Project ID*	Proposed Components	Acres	Net Gain AAHU[9]
BLH1	Bonnet Carré Bottomland Hardwood Restoration	156	99
SWMP1	Swamp Mitigation Bank Credit Purchase	38-14[10]	72
SWMP2	Blind River Swamp Restoration	1,040	339
SWMP3	Bonnet Carré Swamp Restoration	310	121
SWMP4	Maurepas Crawfish Ponds Restoration	1,161	407
SWMP6	Lutcher Polder Farmlands Swamp Restoration	348	151
TOTAL		3,053	1,189
**SWMP5 (Milton Island Swamp Restoration) was removed from the plan. The 131 AAHUs from that site will be accomplished by expanding the acres at SWMP6.*			

4.5.1 Bonnet Carré Bottomland Hardwood Restoration (BLH1)

The BLH1 would restore BLH forests with dredged material from the levee ROW and would include tree plantings. ***This project was assessed in the PIER 36 LPV HSDRRS Mitigation report and is incorporated by reference. Unless discussed below, see PIER 36 for details.*** The borrow material is coming from the levee alignment parallel drainage canals. General impacts related to the parallel drainage canals can be found in the sections above.

[7] Figures are rounded up.
[8] Includes 1.1 acres of impacts from localized storm surge risk reduction measures.
[9] Required acre and AAHUs amounts are rounded up.
[10] Acres are dependent on the final selected mitigation bank credit purchase

4.5.1.1 BLH1 Impacts to Water Quality and Salinity

Affected Environment

The affected Environment can be found in the PIER 36 LPV HSDRRS Mitigation report and is incorporated by reference.

Environmental Consequences

Placement of dredged material for the proposed BLH1 project, is expected to result in some temporary changes in water chemistry for adjacent waters, such as lowered dissolved oxygen, elevated biochemical oxygen demand, elevated turbidity, and elevated nutrients, and oxidation of reduced metals species. Following construction activities, impacts of dredged and graded material on water quality would dissipate. Indirect water quality impacts of the proposed mitigation projects would largely be relegated to within the project footprints, and would likely relate to changes in biogeochemical cycling from establishment of swamp and bottomland hardwood forest habitat in existing agricultural lands, open water areas, and low quality wetlands areas. There should be no changes to salinity due to this project. For the BLH1 projects, because of the small footprint of the proposed projects and their relative isolation from major waterbodies, cumulative water quality impacts in synergy with other projects and activities in the area would generally be minor. In the case of an opening of the Bonnet Carré Spillway (part of the MR&T Flood Risk Reduction System), water quality conditions within the footprint of these mitigation projects would largely be temporarily supplanted by those of the Mississippi River. In addition, if mitigation sites are not sufficiently established in the event of a significant spillway opening, it is possible that the sites would be eroded, thus eliminating any water quality functions and characteristics associated with the mitigation projects.

4.5.1.2 BLH1 Impacts to Natural Environment

4.5.1.2.1 Soils, Water Bottoms and Prime and Unique Farmlands

Affected Environment

The Bonnet Carré Spillway consists almost entirely of frequently flooded Cancienne and Carville (CR) soils. There are no identified prime and unique farmlands in the Bonnet Carré Spillway BLH restoration area. Please see section 3.2.5.1.2 of the Final PIER 36 for more details on the existing conditions within the Bonnet Carré Spillway.

Environmental Consequences

The proposed BLH restoration would result in the filling of 156 acres of open shallow water bottoms with dredged material. The area is frequently flooded during the high water events on the Mississippi River. The area is frequently excavated to acquire borrow, and soils have been impacted from these events. There would be no direct, indirect, or cumulative impacts to prime and unique farmlands, as none are present in the Bonnet Carré Spillway. See Section 5 of the Final PIER 36 for more details regarding direct, indirect, and cumulative impacts within the Bonnet Carré Spillway resulting from proposed restoration projects.

4.5.1.2.2 Vegetation Resources

Affected Environment

The site is a severely disturbed area that has been cleared and excavated to acquire borrow material. These activities have drastically altered normal topography, creating both depressions and ridges and have cleared prior wetland forests. The mitigation site consists of shallow inundated borrow pits which are segmented by disturbed scrub-shrub and perennial herb ridges including: black willow, carpetweed, southern waterhemp, pigweed, mock bishopweed, ragweed, asters, spiny thistle, yankeeweed, goldenrod, cocklebur, peppergrass, morning glories, woolly croton, coffeeweed, clovers, ironweed, evening primroses, wood sorrel, bushy beardgrass, Bermuda grass, Dallis grass, smartweeds, buttercups, bedstraw, vervain, peppervine, and numerous grasses, rushes and sedges. Shallow water canals and ponds are filled with aquatic vegetation, while deeper canals and ponds exhibit open water. Emergent, floating and submersed plants in these water bodies include water hyacinth, delta duck potato, duckweeds, alligator weed, water pennywort, mosquito fern, sedges and rushes, Cyperus spp., Juncus spp., floating water primrose and pickerelweed. Invasive species in the area

include: alligator weed, Chinese tallow tree, Johnson grass, and water hyacinth. Invasive and nuisance plant species, particularly black willow, have colonized these areas. See Figure K-1 in the Mitigation Plan document in Appendix A, Annex K for an area map and details of the mitigation features. Please see section 3.2.5.4.2 of the Final PIER 36 for more details on the placement area.

Environmental Consequences

Direct impacts would be creating 156 acres of BLH using beneficial placement of dredged material and tree plantings. See Figure K-1 in the Mitigation Plan document (Annex K) in Appendix A for a map of the area and details of the mitigation features. Primary impacts include: clearing and grubbing before fill placement; plant with native BLH canopy and mid-story species after grading; install invasive/nuisance plants control, including installation of nutria guards to protect trees against herbivory. Locally positive cumulative impacts would be the aggregate of impacts of converting lower quality fragmented scrub shrub habitats to higher quality swamp habitats resulting from implementing the proposed mitigation action in combination with other ongoing actions and actions within the reasonably foreseeable future including the following. On a larger scale the mitigation would not provide a benefit because it is required to compensate for impacts from the structural component of this project. Considering the historic human population growth and expansion throughout Louisiana and the nation, it is likely that existing low quality habitat lands would continue to be converted to multiple uses, especially for human habitations and structures.

4.5.1.2.3 Wildlife

Affected Environment

Please see wildlife section of the Final PIER 36 for more details on the placement area.

Environmental Consequences

The impacts would be similar to those discussed in the Final PIER 36 except approximately 156 acres of wildlife habitat would be converted from ponds to BLH. Approximately 3,015 acres of forested habitat (BLH and Swamp) would be restored or enhanced by mitigation measures in this project. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin would help retard the loss of wetlands and overall decline of wildlife species within local area and would be beneficial to preserve the species bio-diversity. On a larger scale the mitigation would not provide a benefit because it is required to compensate for impacts from the structural component of this project.

4.5.1.2.4 Aquatic and Fisheries Resources

Affected Environment

The Bonnet Carré Spillway offers areas for freshwater and saltwater fishing, and at times anglers are able to catch sunfish, bass, spotted/speckled trout, and red drum (redfish) from the same area. Please see section 3.2.5.4.2 of the Final PIER 36 for more details on the placement area.

Environmental Consequences

Please see section 3.2.5.4.2 of the Final PIER 36 for more details on the impacts to the placement area.

4.5.1.2.5 Essential Fish Habitat (EFH)

Affected Environment

The BLH-Wet restoration and borrow area has limited tidal connections and is not considered EFH.

Environmental Consequences

There are no direct, indirect or cumulative impacts to EFH due to the Bonnet Carré BLH Restoration.

4.5.1.2.6 Threatened and Endangered Species

Affected Environment

Please see Threatened and Endangered Species section of the Final PIER 36 for more details on the placement area.

Environmental Consequences

The impacts would be similar to those discussed in the Final PIER 36 except approximately 156 acres of open water habitat would be converted to BLH. This conversion would offer more suitable nesting grounds for bald eagles. A total of approximately 3,912 acres of forested habitat would be restored or enhanced by mitigation measures for HSDRRS and the selected project. Locally positive cumulative impacts would help retard the loss of wetlands and overall decline of habitat available for use by Threatened and Endangered Species, bald eagles and colonial nesting waterbirds. On a larger scale, the mitigation would not provide a benefit because it is required to compensate for impacts from the structural component of this project.

4.5.1.2.7 Recreation Resources

Affected Environment

The affected environment is described in Final PIER 36 Bonnet Carré Spillway BLH Restoration 3.3.5.7.2.

Environmental Consequences

The Bonnet Carré mitigation site shares a boundary with All Terrain Vehicle (ATV) area 2 in the Bonnet Carré Spillway. The ATV area has been closed for 3 years with no immediate plans to re-open. No impact is expected to the ATV area. Recreational use (water fowl and big game hunting, fishing, crawfishing, and crabbing) would be displaced during construction and approximately 5 years thereafter or until the plantings take hold, whichever is greater. There is the occasional use of the area by trail runners and an annual adventure race. These activities would be displaced during construction. The proposed swamp habitat could provide opportunities for limited fishing, hunting, and bird watching.

4.5.1.2.8 Noise Resources

Affected Environment

There are many different noise sources throughout the area including commercial and recreational boats, and other recreational vehicles; automobiles and trucks, and all terrain vehicles; aircraft; machinery and motors; and industry-related noise. The noise ordinance for St. Charles Parish allows for the maximum permissible sound levels during the hours of 7:00 am to 10:00 pm are 60 dBA for residential areas and 65 dBA for commercial areas (St. Charles Parish, Louisiana, Code of Ordinances). Noise levels surrounding St. Charles varies depending on the time of day and climatic conditions. Near the mitigation area in the Bonnet Carré Spillway automobile and train traffic, and to a lesser extent air traffic, contribute to the background noise levels. The Bonnet Carré Spillway mitigation area is located on public lands and recreation areas within the spillway could contain sensitive noise receptors where serenity and quiet are an important public resource.

Environmental Consequences

No permanent noise impacts would occur as a result of the mitigation measures and all noise emissions would be relatively short-term, lasting only as long as construction activities. The initial construction would be approximately 12 months. The construction would also be phased starting in one location and moving to the next so the entire area would not be under construction at the same time. Using aerial photography there are no resident sensitive noise receptors in the area. However, individuals recreating within 1000 ft of the mitigation area could be temporarily impacted by the noise of construction. Cumulative impacts would be similar to the structural component for Alternative C but less because future levee lifts are not required for the mitigation component of this project.

4.5.2 Bonnet Carré Spillway Swamp Restoration (SWMP3)

The SWMP3 would restore swamp with dredged material from the levee ROW and would include tree plantings. ***This project was assessed in the PIER 36 LPV HSDRRS Mitigation NEPA document and is hereby incorporated by reference. Unless discussed below, see PIER 36 for details.*** The Affected Environment and Environmental Consequences for most resources are the same as for Bonnet Carré BLH except where described below. The borrow material is coming from the levee alignment and the existing conditions are described in section 2.3 and 2.4 of this document.

4.5.2.1 SWMP3 Impacts to Water Quality and Salinity

The direct indirect and cumulative impacts are the similar as BLH1 above, but vary with the acres of impact.

4.5.2.2 SWMP3 Impacts to Natural Environment

4.5.2.2.1 Vegetation Resources

Environmental Consequences

Direct impacts would be creating 310 acres of swamp using beneficial placement of dredged material and tree plantings. See Figure K-1 in the Mitigation Plan document (Annex K) in Appendix A for a map of the area and details of the mitigation features. Primary impacts include: clearing and grubbing before fill placement; plant with native swamp canopy and mid-story species after grading; install invasive/nuisance plants control, including installation of nutria guards to protect trees against herbivory. Cumulative impacts would be the aggregate of impacts of converting lower quality fragmented scrub shrub habitats to higher quality swamp habitats resulting from implementing the proposed mitigation action in combination with other ongoing actions and actions within the reasonably foreseeable future. The conversion of 310 acres of low quality fragmented scrub shrub habitat from the mitigation site would be in addition to conversion of similar low quality habitats throughout Louisiana and the nation. Considering the historic human population growth and expansion throughout Louisiana and the nation, it is likely that existing low quality lands will continue to be converted to multiple uses, especially for human habitations and structures.

4.5.2.2.2 Wildlife

Environmental Consequences

Impacts would be similar to those discussed in BLH1 except approximately 310 acres of wildlife habitat would be converted.

4.5.2.2.3 Aquatic and Fisheries Resources

Environmental Consequences

The proposed Swamp restoration would result in the filling of 310 acres of open shallow water bottoms with dredged material; otherwise, it is the same as BLH1 above.

4.5.2.2.4 Threatened and Endangered Species

Environmental Consequences

Impacts would be similar to those discussed in Bonnet Carré Spillway BLH Restoration except approximately 310 acres of open water would be converted to swamp habitat which is more suitable nesting grounds for bald eagles and colonial nesting waterbirds.

4.5.3 Purchasing Mitigation Bank credits for swamp habitat (SWMP1)

Affected Environment for all Resources

Various mitigation banks within the LPV coastal zone basin may be capable of supplying enough credits to meet some of the swamp mitigation requirements. Since the bank that may ultimately be selected to provide the necessary mitigation credits is unknown, the existing conditions present at the bank site are similarly unknown. Existing bank habitat quality varies depending on the success criteria met, as specified in the bank's Mitigation Banking Instrument (MBI). Typically, as mitigation success criteria are met and the quality of the habitat increases within the bank, more credits are released for purchase.

Environmental Consequences for all Resources

Direct, indirect and cumulative impacts of the No Action Alternative regarding the various mitigation banks within the Lake Pontchartrain and Vicinity (LPV) coastal zone have been documented in the respective mitigation bank NEPA documents. Since the bank that may ultimately be selected to provide the necessary mitigation credits is unknown, the environmental consequences for a specific bank site are similarly unknown.

5.3.4 Blind River Swamp Restoration (SWMP2)

The SWMP2 would restore swamp with tree plantings in an area where the hydrologic connection has been restored. *This project was assessed in the LCA Amite Report and is hereby incorporated by reference. Unless discussed below, see the LCA Amite Report for details.*

4.5.3.1 SWMP2 Impacts to Natural Environment

4.5.3.1.1 Soils, Water Bottoms, and Prime and Unique Farmlands

Affected Environment

Soils in the Blind River Diversion Canal Swamp restoration area are Barbary (BA) and Maurepas (MA) muck. There are no identified prime and unique farmlands in the Blind River Diversion Canal Swamp restoration area. Please see section 4.2.1 of the LCA Amite Report for more details on the placement area.

Environmental Consequences

Direct and indirect impacts to soil and water bottoms would result from construction associated with the swamp restoration project. A net total of 1,040 acres of wetland soils would be hydrologically restored and nourished. No prime and unique farmlands would be impacted by the proposed restoration project, as none are identified. This project when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin would help retard the overall loss of wetlands within the basin and, when combined with other mitigation projects, would offset the habitat losses caused by other development and natural processes in the basin. Please see section 5.1.1.3 of the LCA Amite Report for more detail on environmental consequences associated with proposed restoration projects in the placement area.

4.5.3.1.2 Vegetation Resources

Affected Environment

Please see section 4.2.6 of the final EIS for the LCA Amite River Diversion Canal Modification (ARDC) project for a description of the affected environment. Forested wetlands, consisting primarily of bald cypress-tupelo swamp, have presently converted into marsh and shallow open water in the planting area. The site would likely convert to open water within less than 50 years.

Environmental Consequences

Please see section 5.62 of the LCA ARDC final EIS for a description of the direct, indirect and cumulative impacts of the environmental consequences of restoring this site which are incorporated herein by reference consistent with CFR 40 1502.21. This project is dependent on construction of the Livingston Parish CIAP project. See Figure K-2 in the Mitigation Plan document (Annex K) in Appendix A for a map of the area and mitigation details. Direct impacts of restoring and planting native swamp canopy and mid-story species on 1,040 acres of deteriorating fragmented swamp; installing nutria guards on all planted trees to protect against herbivore tree loss. Indirect impacts include restoration of 1,040 acres of degrading swamp habitat to higher quality swamp habitat. Cumulative impacts consist of an aggregate of impacts to swamp resources resulting from implementing the restoration of 1,040 acres by the proposed mitigation action in combination with other ongoing actions and actions within the reasonably foreseeable future including: continued coastwide degradation and loss of swamp habitat due to sea level change and other natural factors; implementation of swamp restoration projects in Louisiana by the LCA program and the CWPPRA programs; implementation of swamp restoration features within the Louisiana State Master Plan; implementation of the LCA Small Diversion at Convent/Blind River and the Maurepas Diversion projects; local city and parish swamp degradation and restoration efforts; construction of other hurricane and storm damage risk reduction

projects; road construction; and other human encroachment. These would be in addition to similar activities nationwide.

4.5.3.1.3 Wildlife

Environmental Consequences

Direct and Indirect Impacts: Impacts would be similar to those discussed in the LCA Amite Report except that 1,040 acres of forested wetlands habitat would be restored. The cumulative impacts would be the same as those identified for BLH1.

4.5.3.1.4 Aquatic and Fisheries Resources

Environmental Consequences

Planting vegetation on 1,040 acres would be conducted by hand and would have limited to no direct impacts on aquatic species. The swamp is flooded for a short while every three to five years and aquatic species access is limited to those times. The flooding would contribute to the improved health of the freshwater swamp system and indirectly would benefit aquatic species that use the swamp. There would be a local positive cumulative impact to the area when this is added to the benefits provided by the Livingston Parish CIAP project (the hydraulic modification portion of alternative 39 from the LCA Amite Report) and the State's Amite Restoration project (alternative 33 from the LCA Amite report). On a larger scale the planting would not provide a benefit because it is required to compensate for impacts from the structural component of this Project.

4.5.3.1.5 Essential Fish Habitat (EFH)

Affected Environment

Blind River swamp mitigation site is not classified as EFH in the GIS database layers provided by the NOAA National Marine Fisheries Service website.

Environmental Consequences

There is no direct, indirect or cumulative impact to EFH at this site.

4.5.3.1.6 Threatened and Endangered Species

Environmental Consequences

Direct and Indirect Impacts: Impacts would be similar to those discussed in the LCA Amite Report except that 1,040 acres of forested wetlands habitat would be restored and available for use by bald eagles and colonial nesting waterbirds. *Cumulative Impacts: Same as* Bonnet Carré Spillway BLH Restoration

4.5.3.1.7 Aesthetics and Visual Resources

Affected Environment

The Blind River Mitigation sites are located north of the Maurepas Swamp WMA boundary, along the Amite River Diversion Canal. The area is remote and user activity (fishing, hunting, and other water traffic) is extremely low. See section 4.2.13 of the LCA Amite Report for more details on the affected environment.

Environmental Consequences

The Blind River Mitigation sites are located north of the Maurepas Swamp WMA boundary, along the Amite River Diversion Canal, with little user activity other than that associated with recreational uses. Direct and indirect impacts are negligible. For more information, see the LCA Amite Report, section 5.13.

4.5.3.1.8 Resource: Recreation

Affected Environment - The site is in the Maurepas Swamp WMA adjacent to the National Scenic Blind River. Recreation within the project area includes hunting (deer, small game, waterfowl), fishing, and boating.

Environmental Consequences

During project construction recreation users would be temporarily displaced. If construction occurs during hunting season (October – February), safety issues and disturbance to WMA users is expected. Best

management practices would be employed. No impact to recreation users of Blind River is expected. There is a vegetation buffer between the project and river to minimize visual impacts for those travelling on the river.

4.5.3.1.9 Noise

Affected Environment

There are many different noise sources throughout the area including commercial and recreational boats, and other recreational vehicles; automobiles and trucks, and all terrain vehicles; aircraft; machinery and motors; and industry-related noise. The maximum permissible sound levels for Livingston Parish during the hours of 6:00 am and 11:00 pm are 85 dBA (Livingston Parish Council, Louisiana, Code of Ordinances). Noise levels surrounding Livingston Parish vary depending on the time of day and climatic conditions. Near the Blind River mitigation area automobile and train traffic, and to a lesser extent air traffic, contribute to the background noise levels.

Environmental Consequences

No permanent noise impacts would occur as a result of Blind River mitigation measures, and all noise emissions would be relatively short-term, lasting only as long as construction activities. The initial construction would be approximately 12 months. The construction would be phased starting in one location and moving to the next so the entire area would not be under construction at the same time. Table 4-2 presents noise emissions for construction equipment expected to be used during the construction activities. Anticipated sound levels at 50 ft would range from 76 dBA to 82 dBA based on data from the FHWA (2007).

Noise levels may result in wildlife avoiding the area during construction. Residences could experience higher than ambient noise levels during construction, however these levels would be temporary during the period of construction and would be limited to daylight hours and are below the noise ordinances for Livingston parish.

Aerial photos were used to determine the number of sensitive noise receptors within the 1,000 ft zones. Table 4-2 summarizes the total sensitive receptors with 1000 ft, segregated by parish that would be temporarily impacted during construction of the projects. Impacts on the ambient noise environment resulting from the construction would be minor and short-term. Approximately, 4 single-family homes are located within 1,000 ft from the edge of the project corridors. These sensitive noise receptors could experience noise emissions greater than 65 dBA, which are normally unacceptable (HUD 1984). Construction work could occur as long as 10 hours a day, 6 days a week. However, these noise levels are below the Livingston Parish maximum acceptable level of 85 dBA. Noise emissions created during construction activities would be temporary; therefore, long-term impacts are negligible. Construction of this project is not anticipated to add significantly to the cumulative effect of noise in the project areas as the construction activities would be temporary, restricted to daylight hours and encourage the avoidance of the project area by wildlife only during the period of construction. Cumulative impacts would be similar to the structural component for Alternative C but less because future levee lifts are not required for the mitigation component of this project.

4.5.4 Maurepas Crawfish Ponds Swamp Restoration (SWMP4)

The SWMP4 would restore swamp by degrading dikes of crawfish ponds and restoring hydrologic connections and would include tree plantings.

4.5.4.1 SWMP4 Impacts to Water Quality and Salinity

The direct and indirect impacts are similar as BLH1 above, but vary because of the acres of impact.
Cumulative impacts: Local development may affect quality of created swamp. Local runoff in these areas from urban areas and agricultural lands (primarily utilized for sugarcane) may contain elevated levels of metals, nutrients, pesticides, and other organic contaminants capable of being assimilated by and augmenting these created wetlands (e.g., see Demcheck et al. 2004, Southwick et al. 2002). Future development in areas adjacent to these mitigation sites could enhance runoff quality.

4.5.4.2 SWMP4 Impacts to Natural Environment

4.5.4.2.1 Soils, Water Bottoms, and Prime and Unique Farmlands

Affected Environment

The Maurepas Crawfish Ponds Swamp restoration area consists entirely of Schriever clay. The restoration areas are approximately 300 acres of crawfish ponds. There are no identified prime and unique farmlands in the restoration area.

Environmental Consequences

Direct and indirect impacts to soil and water bottoms would result from construction activities associated with the swamp restoration project. A net total of 1,161 acres of wetland soils would be hydrologically restored and nourished. Approximately 78 acres of shallow water bottoms would be directly impacted. No prime and unique farmlands would be impacted by the proposed restoration project, as none are identified.

4.5.4.2.2 Vegetation Resources

Affected Environment

This 1,161-acre area is presently characterized as shallow water ponds interspersed with canals and natural bayous. There are also fallow or drained ponding areas which have an overgrowth of scrub shrub, primarily willow. Around 1950, the practice of re-flooding rice fields after harvest became commonplace as a method to produce crawfish for harvest during the autumn, winter and early spring. This practice of crawfish 'farming' eventually spread to impounded woodlands and marshland as well. By the mid-1960s, acreage had increased to approximately 10,000 acres of managed crawfish ponds. At this point, an industry based on peeling crawfish became established, which in turn fueled further expansion of both crawfish farming and wild harvests. Acreage continued to increase, from approximately 44,000 acres in the mid-1970s to roughly 182,000 acres in 2012 (source:http://www.agmrc.org/commodities products/aquaculture/crawfish-profile/ accessed March 28, 2014).

Environmental Consequences

Direct impacts would be conversion of 1,161 acres of existing crawfish ponds to swamp through land grading, especially removal of water management levees to create uniform elevations and open exchange of water with adjacent swamps; clearing and grubbing; invasive/nuisance plants control including installation of nutria guards to protect trees against herbivory; and planting with native swamp canopy and mid-story species after grading. See Figure K-3 in the Mitigation Plan document (Annex K) in Appendix A for a map of the area and mitigation project details. Cumulative impacts would be the aggregate of impacts to crawfish pond resources resulting from implementing the proposed mitigation action in combination with other ongoing actions and actions within the reasonably foreseeable future including the following. The loss of 1,161 acres crawfish ponds out of the Louisiana state-wide 182,000 acres would be a loss of about 0.6 percent. Considering the historical growth of the crawfish industry in Louisiana it is likely that existing rice and other agricultural lands, as well as woodlands and swamps, would continue to be converted to crawfish ponds to meet ever increasing consumer demands for this product.

4.5.4.2.3 Wildlife

Affected Environment

Depending on water level, and if crawfish are present, crawfish ponds could provide foraging grounds for wading birds, waterfowl, birds of prey, reptiles, amphibians and mammals such as raccoons, rabbits, deer, otter and mice.

Environmental Consequences

Direct Impacts: Some more immobile wildlife species (e.g. mice, rats, and crawfish) may experience demise during construction. Species that utilize agricultural fields when crops are present may be temporarily displaced during by construction activity. However, the creation of high quality swamp habitat greatly outweighs the loss of crawfish ponds that are no longer used for production.

Indirect Impacts: The conversion of 1,161 acres of crawfish ponds to swamp land would provide shelter, nesting and foraging grounds for many animals including the ones listed above.

Cumulative Impacts: Same as Bonnet Carré Spillway BLH Restoration

4.5.4.2.4 Aquatic and Fisheries Resources

Affected Environment

The amount of water in the existing crawfish pond depends on if it is still in production, the season, if the outer dikes have been maintained or in disrepair and dike elevation. If water has been able to flow in naturally the species that can be found would be dominated by fresh water species such as crawfish, sunfish, bowfin, catfish, and bass.

Environmental Consequences

The crawfish ponds would be drained before any construction would begin, most mobile species would swim out of the system therefore they would not be directly impacted. The drying out of the area and the degrading of the internal and external dikes would eliminate any non mobile species. The planting of trees and reconnecting of the area to the adjacent swamps would allow aquatic species to recolonize the area and be a positive impact on the resource. There would be locally positive cumulative impacts on this resource, but on a larger scale the mitigation would not provide a benefit because it is required to compensate for impacts from the structural component of this project.

4.5.4.2.5 Essential Fish Habitat (EFH)

Affected Environment

The existing crawfish ponds presently are not classified as EFH.

Environmental Consequences

There is no direct, indirect or cumulative impact to EFH at this site.

4.5.4.2.6 Threatened and Endangered Species

Affected Environment

No listed species occur in this area. However, crawfish ponds are utilized as foraging grounds by colonial nesting waterbirds and the delisted bald eagle.

Environmental Consequences

Direct Impacts: Based on review of existing data, the USACE finds that this feature would have no effect on listed species or their critical habitat. The construction of swamp habitat would convert foraging grounds to suitable habitat for shelter, nesting and foraging grounds for bald eagles and colonial nesting waterbirds.
Indirect Impacts: There is potential for temporary indirect impacts due to construction activity. These impacts would be the avoidance of the area during construction. The area is surrounded by suitable foraging habitat; therefore it is assumed that any birds utilizing the ponds would simply forage elsewhere. *Cumulative Impacts:* Same as those identified in connection with Bonnet Carré Spillway BLH1 Restoration.

4.5.4.2.7 Aesthetics and Visual Resources

Affected Environment

The Maurepas Crawfish Ponds Mitigation sites are split into three areas. The first is located just west of Sorrento adjacent to US-61. The landscape of the area is currently made up of crisscrossing small canals, open water ponds and abundant vegetation surrounding the crawfish ponds. Land use in the area is primarily agricultural and undeveloped rural lands. Access to the first site can be had via US-61 and Texaco road. Visual accessibility is abundant for approximately 1.5 miles along the Highway 61 corridor. User activity in the area is moderate with typical industrial and commercial highway traffic between two major cities (New Orleans and Baton Rouge), and tourist traffic along the Great River Road (US- 61).

The second mitigation site is located just north of the intersection between Hwy 70 and Hwy 3125. Water resources are less substantial here. The landscape of the area is similar to that mentioned at the first site, with agricultural and undeveloped rural lands surrounding the project site. User activity is lower here and primarily relegated to farm traffic.

The third mitigation site is located at the southwestern corner of the West Maurepas Swamp WMA boundary, near the intersection of Hwy 3214 and Hwy 3125. The landscape, water resources, and land uses are similar to that mentioned under sites 1 and 2. User activity is similar to that mentioned under site 2.

Environmental Consequences

The Maurepas Crawfish Ponds Mitigation sites have relatively high visibility and could be considered institutionally significant due to their proximity to the Maurepas Swamp WMA. The conversion of the open water crawfish ponds into swamp would drastically improve scenic quality in the area and improve view sheds, especially along US-61. Technical design criteria would be satisfied with the conversion of open water into a tree filled landscape. Direct impacts would therefore be considerably to the positive and noticeable to daily users. On the downside, user activity would see temporary interruptions during construction of the mitigation features due to vehicles moving in and out of the area. However; it is important to note that after completion of the project, the area would return to normal.

4.5.4.2.8 Recreation

Affected Environment

There is no recreation occurring within the commercial ponds.

Environmental Consequences

There is no impact to recreation resources.

4.5.4.2.9 Noise

Affected Environment

There are many different noise sources throughout the area including commercial and recreational boats, and other recreational vehicles; automobiles and trucks, and all terrain vehicles; aircraft; machinery and motors; and industry-related noise. The maximum permissible sound levels for Ascension Parish are 75 dBA during the hours of 6:00 am and 9:00 pm (http://library.municode.com/index.aspx?clientId=10989). St. James Parish does not have any specific ordinances regarding construction noise. Noise levels surrounding Ascension and St. James Parishes vary depending on the time of day and climatic conditions. Near the localized storm surge risk reduction system in St. James Parish, automobile and train traffic, and to a lesser extent air traffic, contribute to the background noise levels.

A number of parks and the Maurepas WMA are located adjacent to or near the Maurepas Swamp Crawfish Pond mitigation areas. These public lands are sensitive noise receptors where serenity and quiet are an important public resource. The areas with the greatest number of sensitive noise receptors, such as residential homes and apartments, schools, churches, and parks are also located in St. James and to some extent in Ascension Parish. They are located along Hwy 3125 and Hwy 61 (Airline Hwy).

Environmental Consequences

Direct, Indirect and Cumulative Impacts: No permanent noise impacts would occur as a result of localized storm surge risk reduction measures and all noise emissions would be relatively short-term, ending after construction. The initial construction would be approximately 12 months. The construction would also be phased starting in one location and moving to the next so the entire area would not be under construction at the same time. Table 4-2 presents noise emissions for construction equipment expected to be used during the construction activities. Anticipated sound levels at 50 ft would range from 76 dBA to 82 dBA based on data from the FHWA (2007).

The majority of mitigation construction would require the use of earth-moving equipment, which produces

noise emissions of 81 dBA. The noise model projected that noise levels of 81 dBA were required to travel 300 ft before they attenuate to acceptable levels of 65 dBA. To achieve an attenuation of 81 dBA to a normally unacceptable level of 75 dBA, the distance from the noise source to the receptor was 100 ft.

Aerial photography was used to determine the number of sensitive noise receptors within the 1,000 ft zones. Table 4-2 summarizes the total sensitive receptors with 1000 ft, segregated by parish that would be temporarily impacted during construction of the projects. A number of parks and recreational areas are located near the projects, including the Maurepas WMA, and these areas have the potential to experience increased noise emissions.

Impacts on the ambient noise environment resulting from the construction would be minor and short-term. Approximately, 31 single-family homes (10 in St. James Parish and 21 in Ascension Parish) are located within 1,000 ft from the edge of the project corridors. These sensitive noise receptors could experience noise emissions greater than 65 dBA, which are normally unacceptable (HUD 1984). Construction work could occur as long as 10 hours a day, 6 days a week. In Ascension Parish residential areas where the noise ordinances could be exceeded temporarily, the contractor would be required to utilize best management practices such as utilizing noise barriers to reduce noise impacts or obtain permission from local authorities to temporarily exceed maximum permissible sound levels. Cumulative impacts would be similar to the structural component for Alternative C but less because future levee lifts are not required for the localized storm surge risk reduction component of this project.

4.5.5 Lutcher Polder Farmlands Swamp Restoration (SWMP6)

The SWMP6 would restore swamp by degrading farmfields and restoring hydrologic connections and would include tree plantings.

4.5.5.1 SWMP6 Impacts to Water Quality and Salinity

The direct and indirect impacts are similar to those identified in BLH1 above, but vary because of the acres of impact.Cumulative impacts: Same as the modification of the SWMP4 above.

4.5.5.2 SWMP6 Impacts to Natural Environment

4.5.5.2.1 Soils, Water Bottoms, and Prime and Unique Farmlands

Affected Environment

The Lutcher Polder Farmlands Swamp Restoration area is comprised of active agriculture lands. The area consists of Cancienne (CmA) and Gramercy (GrA) soils, both of which are classified as prime farmlands.

Environmental Consequences

Direct and indirect impacts to soils would result from construction activities associated with the swamp restoration project. A net total of 348 acres of prime farmland soils would be directly impacted and converted to non-agricultural use. This project when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin would help retard the overall loss of wetlands within the basin and, when combined with other mitigation projects, would offset the habitat losses caused by other development in the basin.

4.5.5.2.2 Vegetation Resources

Affected Environment

This 348-acre area is presently characterized as agricultural land with a portion of fallow acres.

Environmental Consequences

Direct impacts include the conversion of 348 acres of existing agricultural fields to swamp habitats by clearing and grubbing woody vegetation within the sites before grading, including mechanized removal of invasive

and nuisance plant species. Thereafter, the mitigation plan provides that the Project will plant 348 acres with native swamp canopy and midstory species and install nutria guards on all planted trees to protect against herbivore tree loss. The loss of 348 acres of agricultural lands primarily for sugar cane, compared to the Louisiana state-wide 439,256 acres in sugar cane production in 23 Louisiana parishes during 2013 (source: http://www.lsuagcenter.com/agsummary/narrative accessed March 28, 2014) is a loss of .08 percent. Considering the historical growth and expansion of agricultural endeavors in Louisiana and the Nation, it is likely that conversion of existing agricultural lands for mitigation purposes would be offset by agricultural encroachment and conversion of woodlands and marshlands to agricultural fields to meet increasing consumer demands for sugar and other agricultural crops.

4.5.5.2.3 Wildlife

Affected Environment

Agricultural land provides foraging grounds for various species of birds such as sparrow, crows, song birds and birds of prey. Mammals such as skunks, rabbits, armadillo, raccoons, mice and deer may utilize this habitat as well. Snakes and other reptiles could use agricultural lands for nesting and foraging.

Environmental Consequences

Direct Impacts: Some more immobile wildlife species (e.g. mice, rats) may experience demise during construction. Species that utilize agricultural fields when crops are present may be temporarily displaced during construction activity. However, the creation of high quality swamp habitat greatly outweighs the loss of agricultural fields that are periodically used for crop production.

Indirect Impacts: The conversion of 348 acres of agricultural land to swamp would provide shelter and nesting grounds for many animals including the ones listed above. It would also attract some species of colonial nesting waterbirds. *Cumulative Impacts:* Same as those identified in connection with Bonnet Carré Spillway BLH1 Restoration.

4.5.5.2.4 Aquatic and Fisheries Resources

Affected Environment

The existing agricultural fields presently do not provide fisheries or aquatic resources.

Environmental Consequences

There is no direct, indirect negative impact to aquatic and fisheries resources at this mitigation site. The planting of trees and reconnecting of the area to the adjacent swamps would allow aquatic species to recolonize the area and be a positive impact on the resource. There would be locally positive cumulative impacts on this resource, but on a larger scale the mitigation would not provide a benefit because it is required to compensate for impacts from the structural component of this project.

4.5.5.2.5 Essential Fish Habitat (EFH)

Affected Environment

The existing agricultural fields presently are not classified as EFH.

Environmental Consequences

There is no direct, Indirect or Cumulative impact to EFH at this site.

4.5.5.2.6 Threatened and Endangered Species

Affected Environment

No listed species occur in the area. However, this habitat type does offer potential utilization by the Sprague's pipit. The Sprague's pipit, is a candidate species for federal listing as threatened or endangered. It winters in Louisiana, arriving from northern breeding grounds in September and remaining until April. Sprague's pipit exhibits a strong preference for open grassland (i.e., native prairie) with native grasses of intermediate height and thickness, and it avoids areas with too much shrub encroachment. This species is a ground feeder and forages mainly on insects but occasionally eats seeds (personal communication USFWS Brigette Firmin).

Environmental Consequences

Direct Impacts: Impacts would be the conversion of 348 acres of suitable habitat, for use by the wintering Sprague's pipit, to unsuitable habitat. If any of these birds are present they would be forced to permanently relocate. The USACE will consult with USFWS when the species is listed.

Indirect Impacts: Indirect impacts would be the benefit of 348 additional acres locally of swamp habitat available for use by bald eagles and colonial nesting waterbirds.

Cumulative Impacts: Same as those identified in connection with Bonnet Carré Spillway BLH1 Restoration.

4.5.5.2.7 Aesthetics and Visual Resources

Affected Environment

The Lutcher Polder Farmland Mitigation site is located approximately 1 mile from the southern boundary of the West Maurepas WMA, and approximately 2 miles northeast of the community of Hester. The site and its surrounding area are primarily made up of agricultural lands mixed with low density residential; with dense forestation located to the Northwest towards Maurepas Swamp WMA. User access can be had from Hwy 3125 and Hwy 642 where traffic and user activity are relatively low and relegated to agricultural and some minor commuter purposes.

Environmental Consequences

The Lutcher Polder Farmland Mitigation site has relatively high visibility and public significance to the residents living adjacent to the area. The conversion of the open water into swamp would drastically improve scenic quality in the area and improve view sheds. Technical design criteria would be satisfied with the conversion of open water into a tree filled and vegetated landscape. Direct impacts would therefore be considerably to the positive and noticeable to daily users.

On the downside, user activity would see temporary interruptions during construction of the mitigation features due to vehicles moving in and out of the area. However; it is important to note that after completion of the project, the area would return to normal.

Cumulative Impacts:

Area diversion projects (LCA CBRD and the Maurepas Diversions) would provide fresh water and improve wetlands. Wetlands contribute to the visual quality of an area, especially where open water areas are abundant. Wetlands, swamps and forested lands break up the view shed providing variety, color, texture and repetition in an appealing manner. These elements satisfy the needs of technical significance and increase the value of the view sheds in the publics' eye.

Of 33 USACE HDSRRS projects (IER 1-33), minimal impacts to visual resources were found for projects in the St. Charles, Chalmette Loop, Belle Chasse, and Gretna-Algiers area. Minor impacts to visual resources occurred in Jefferson East, Orleans East, New Orleans East, Harvey Westwego, and Lake Cataouatche. Impacts were typically associated with land and water access where project areas were remote and well out of the public view shed. In other cases, levees and flood protection measures were already in place and a part of the existing view shed, which created minimal impacts. More considerable impacts were associated with flood wall construction and flood gate construction in areas that previously did have features such as these. Some positive impacts were found among the various borrow IERs, where flat open areas were broken up with the addition of borrow ponds.

Cumulatively, the above environmental documents identify minor adverse impacts to visual resources with *nduce*the potential of enhanced habitat that may positively impact visual resources in the future.

4.5.5.2.8 Recreation

Affected Environment

There is no recreation occurring within the project area that is currently being used for agriculture.

Environmental Consequences
There is no impact to recreation resources.

4.5.5.2.9 Noise

Affected Environment
There are many different noise sources throughout the area including commercial and recreational boats, and other recreational vehicles; automobiles and trucks, and all terrain vehicles; aircraft; machinery and motors; and industry-related noise. The maximum permissible sound levels for Ascension Parish are 75 dBA during the hours of 6:00 am and 9:00 pm (http://library.municode.com/index.aspx?clientId=10989). St. James Parish does not have any specific ordinances regarding construction noise. Noise levels surrounding Ascension and St. James Parishes vary depending on the time of day and climatic conditions. Near the localized storm surge risk reduction system in St. James Parish automobile and train traffic, and to a lesser extent air traffic, contribute to the background noise levels.

A number of parks and the Maurepas Wildlife Management Area are located adjacent to or near the Maurepas Swamp Crawfish Pond mitigation areas. These public lands are sensitive noise receptors where serenity and quiet are an important public resource. The areas with the greatest number of sensitive noise receptors, such as residential homes and apartments, schools, churches, and parks are also located in St. James and to some extent in Ascension Parish. They are located along Hwy 3125 and Hwy 61 (Airline Hwy).

Environmental Consequences
Direct, Indirect and Cumulative Impacts: No permanent noise impacts would occur as a result of localized storm surge risk reduction measures and all noise emissions would be relatively short-term, lasting only as long as construction activities. The initial construction would be approximately 12 months. The construction would be phased starting in one location and moving to the next so the entire area would not be under construction at the same time. Table 4-2 presents noise emissions for construction equipment expected to be used. Anticipated sound levels at 50 ft would range from 76 dBA to 82 dBA based on data from the FHWA (2007).

The majority of the mitigation construction would require the use of earth-moving equipment, which produces noise emissions of 81 dBA. The noise model projected that noise levels of 81 dBA were required to travel 300 ft before they attenuated to acceptable levels of 65 dBA. To achieve an attenuation of 81 dBA to a normally unacceptable level of 75 dBA, the distance from the noise source to the receptor was 100 ft.

Aerial photos were used to determine the number of sensitive noise receptors within the 1,000 ft zones. Table 4-2 summarizes the total sensitive receptors within 1,000 ft, by parish, that would be temporarily impacted during construction. A number of parks and recreational areas are located near the projects, including the Maurepas Wildlife Management Area. These areas have the potential to experience increased noise emissions.

Impacts on the ambient noise environment resulting from the construction would be minor and short-term. Approximately, 31 single-family homes (10 in St. James Parish and 21 in Ascension Parish) are located within 1,000 ft from the edge of the project corridors. These sensitive noise receptors could experience noise emissions greater than 65 dBA, which are normally unacceptable (HUD 1984). Construction work could occur as long as 10 hours a day, 6 days a week. In Ascension Parish residential areas where the noise ordinances could be exceeded temporarily, the contractor would be required to utilize best management practices such as utilizing noise barriers to reduce noise impacts or obtain permission from local authorities to temporarily exceed maximum permissible sound levels. Cumulative impacts would be similar to the structural component for Alternative C but less because future levee lifts are not required for the localized storm surge risk reduction component of this project.

5.0 RECOMMENDED PLAN (PREVIOUSLY TENTATIVELY SELECTED PLAN)

Alternative C is the Recommended Plan. As discussed in Chapter 3, after the TSP was verified, the team developed feasibility-level designs for the Recommended Plan. Investigations included detailed cost estimates, benefits, impacts, and implementation requirements. Below is a summary project description of the Recommended Plan. Additional details on the plan are found in the technical appendices.

5.1 Description of the Recommended Plan

The Recommended Plan includes the construction of an 18.27-mile levee system around the communities of Montz, Laplace, Reserve and Garyville. The plan also includes the construction of localized storm surge risk reduction measures in St. James Parish. An overview of the entire risk reduction system is shown on Figure 5-1.

Levee System

The levee system would begin at the upper guide levee of the Bonnet Carré Spillway, north of an underground utility pipeline right of way and US-61. The levee would head northwest paralleling the pipeline right of way and pass under I-10. Past I-10 the levee would enclose the I-10 and I-55 interchange and cross US-51. It would then track north of I-10 and a pipeline transmission corridor. Past the Belle Terre/I-10 exit, the levee would pass back under I-10 and parallel the pipeline corridor through wetlands until it crosses Hope Canal. The levee would then turn south; cross the pipeline transmission corridor and then extend to the MRL.

The levee system would reduce the risk of flooding for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 could allow for an earlier re-entry route for residents and emergency responders in southeast Louisiana, including residents in the New Orleans metropolitan area.

The construction of the structural component of the project, hereafter referred to as the "levee system", would be based on a 1% probability storm level of risk reduction and a 2020 intermediate RSLR condition. In order to maintain the 1% probability storm level of risk reduction system over the period of evaluation (50 years) the levee system would include future levee lifts based on the 2070 intermediate RSLR conditions. For example, at the starting point of the upper guide levee of the Bonnet Carré Spillway the levee would be constructed to a top of levee elevation of 15' NAVD 88 in 2020. In the future, the levee at this point would be lifted to a final elevation of 19.5' NAVD 88 based on the 2070 intermediate RSLR conditions. This is the highest elevation point of the constructed levee system. The levee would start at this height and taper down to a final top levee elevation of 8.5' NAVD 88 near the MRL. The final 2070 top levee elevation near the MRL would be 16' NAVD 88.

The system would consist of earthen levees, floodwalls (T-Walls), floodgates, drainage canals, a flood-side ditch for hydraulic connectivity for wetlands north and south of the system, drainage structures and pump stations along the alignment, and mitigation measures (Figure 5-2). Structures through the levee would be built to the 2070 intermediate RSLR condition, to prevent costly future retrofits required for anticipated changing sea levels.

Starting at the upper guide levee of the Bonnet Carré Spillway and heading west along levee the project would construct a 646 linear foot (hereafter "LF") T-Wall to pass under the existing I-10 overpass. Past this point, 1,100 cubic feet per second (cfs) pump station with three 68" outfalls would be built at Montz Canal, which is very near the I-55 northbound entrance ramp. The pump station, when the system is closed, would mainly remove rainwater flows from the Woodland, the River Forest, and the Prescott Canals. A 267 LF T-Wall and two 6' x 18' x 27' gated drainage structures would also be constructed at this location. This location and all

locations with pump stations or drainage structures would be connected to a flood side ditch and a protected side canal that would parallel the entire levee length. The canals would be used to maintain the existing connection between swamps located inside and outside of the levee system. The protected side canal would also serve as a redundancy connection if one of the pump stations failed during an event.

Past the Montz Canal, at the location of US-51, a 188 LF gated structure would be placed through the levee. Directly west of US-51, a 247 LF T-Wall would cross under I-55. The levee would continue to the west until the levee intercepts the first pipeline crossings near Vicknair Canal. Two sections of T-Walls would be used for these pipeline crossing, a 550 LF T-Wall, and a 623 LF T-Wall. Half of the 35 required pipeline relocations would be at these two locations. For purposes of this report, it is expected that all of the pipeline relocations would be compensable. Relocations are expected to take place in the proposed levee right of way (ROW) or existing pipeline ROW. Determination of the compensability of these relocations will be determined during the engineering and design phase of this project if it is authorized.

Continuing west, the levee would then cross Ridgefield Canal. Ridgefield Canal is located between the I-10 Louisiana Department of Transportation and Development (LaDOTD) weigh station and the I-10/LA 3188 exit. A 200 cfs pump station with three 30" outfalls would be built at Ridgefield Canal. The pump station, when the system is closed, would mainly remove rainfall flows from Laplace Plantation, Perriloux, Ridgefield, Tebo and Vicknair canals. A 244 LF T-Wall and with two 6' x 18' x 267' gated drainage structures would also be constructed at this location.

West of the Ridgefield Canal, a 100 LF floodgate would be constructed at the location of the Perriloux Canal to allow rainfall flows to flow through the levee when the system is not closed.

West of the I-10/LA 3188 exit, a 247 LF T-Wall would be constructed to cross back under I-10. The levee would continue to parallel the pipeline corridor through wetlands until it reaches Reserve canal. A 400 cfs pump station with three 48" outfalls would be built at this location. The structure at this location would also include two 6' x 20' x 25' drainage structure with a boat bay and 335 LF of T-Walls. Small boats would still be able to pass through the drainage structure when the system is open.

Continuing west, the levee would then cross Mississippi Bayou. A 6' x 10' x 25' drainage structure with a 267 LF T-Wall would be constructed at this location.

The levee would then continue west toward Hope Canal, until it reaches the next major set of pipeline crossings. All of the remaining major pipeline relocations would be at this location. Two sections of T-Walls would be used for these pipeline crossing, a 400 LF T-Wall, and a 300 LF T-Wall. As with the other pipelines, for purposes of this report, it is expected that the pipeline relocations would be compensable. Relocations are expected to take place in the proposed levee ROW or existing pipeline ROW at this location. Determination of the compensability of these relocations will be determined during the engineering and design phase of this project if it is authorized.

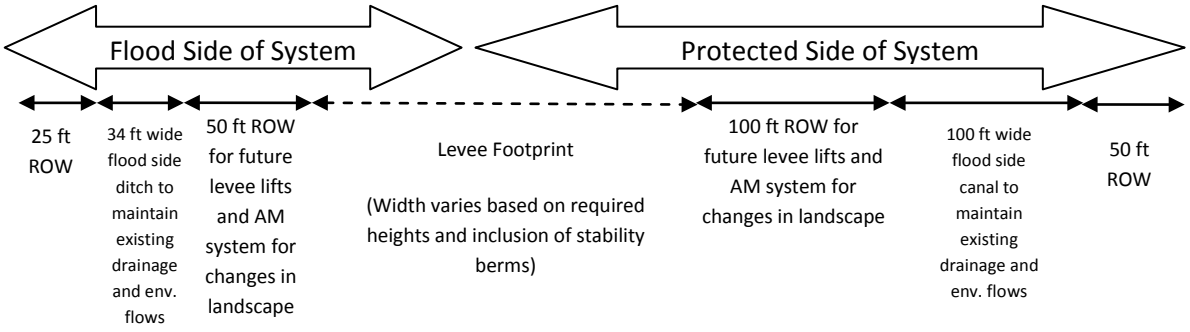
The levee would then continue west until it reaches Hope Canal. A 450 c.f.s pump station with three 54" outfalls would be constructed at this location. Currently the design and cost includes a 6' x 20' x 25' drainage structure and a 247 LF T-Wall, but the Hope Canal location is also the same location of the State of Louisiana's proposed River Reintroduction into Maurepas Swamp diversion. The WSLP project has been coordinating activities between the project development teams, but for the purposes of the WSLP feasibility design, we do not consider the diversion project as a future landscape feature, since the State has not identified funding and has filed an incomplete permit application to the USACE for construction of the project. The USACE would continue to monitor the status of the diversion project. The team expects that if the diversion project moves forward it would be constructed on the flood side of the levee and would parallel the levee from Hope Canal to the MRL.

When the levee turns south, past Hope Canal to tie into the MRL, the levee would cross US-61, a pipeline ROW, and two railroad tracks. US-61 would be raised to hump over the levee at the crossing point. The pipeline crossing would include a 301 LF T-Wall, while the two railroad crossings would include a 150 LF gate structure and a 50 LF gate structure.

In all, there would be a total of 5,001 LF of T-Walls, 4 pump stations with associated drainage structures, 2 drainage structures, one gated road crossing, and 2 gated railroad crossings.

4.69 miles of the upper guide levee of the Bonnet Carré Spillway from the spillway control structure to the WSLP tie-in point would be included in the WSLP levee system, but there would be no construction activities associated with this Bonnet Carré levee. Existing levee heights are high enough to prevent 1% probability storm surges from entering the WSLP system during storms. The construction of the WSLP tie-in point would be to set to elevation of 15' NAVD 88 while the current upper guide levee elevation is 15.5' NAVD 88. The upper guide levee heights in the future would be monitored to determine if sections of the Bonnet Carré Spillway levee would need future lifts to prevent overtopping of storm surges into the WSLP system.

All levee right of ways would have the following typical dimensions:



The 50' and 100' right of ways adjacent to the levee footprints would be used for future levee lifts. The levee would be lifted five times over the period of evaluation. The initial construction would be comprised of an initial construction of the base of the levee and a lift that would be used to obtain a 1% probability storm level of risk reduction system in 2020. Additional levee lifts to maintain a 1% probability storm level of risk reduction system would take place in years 2030, 2045, and in 2060.

9,000,000 cubic yards (cy) of compacted and un-compacted fill would be required to create and maintain the levee over the period of evaluation. A portion of the initial fill material, if suitable, would be obtained from the canals and ditch, approximately 1,678,000 cy. Borings indicate that the top 4' of the cross section of these features would not be suitable as levee fill material. The top 4' of material; approximately 1,685,000 cy, would be used beneficially at mitigation plan sites, or disposed of appropriately by the contractor. The remaining fill for the levee, approximately 7,322,000 cy, would be obtained from the Bonnet Carré Spillway.

The levee footprint would vary based on the designed cross section and required top of levee heights by each levee section. The top of the levee would have a 10' wide crown and the protected side of the levee system would be based on a 1:3 side slope, with some reaches including a geotechnical stability berm. 3,400,000 square yards of geotextile fabric would be placed under the levee footprint and approximately 80,000 cy of aggregate limestone would be used to build a road on the levee crown.

The total levee construction ROW would be 1,235 acres. Real estate agreements would be acquired on all features. A perpetual flood protection levee easement would be acquired for the 669 acres of the levee and

floodwall features. A perpetual flood protection levee easement would be acquired for the 33 acres of the T-Walls. For the two canals, a 519 acre perpetual drainage ditch easement would be acquired. For the remaining features, the 4 pump stations would require 9 acres and the 3 gated crossings would require 5 acres to be acquired based on fee, excluding minerals. In addition to the permanent easements, 49 acres of temporary access easements and 12 acres of temporary work area easements would be acquired. These temporary access and work access areas would be on existing roadways or developed areas of the project area and would not be in environmentally sensitive areas.

All of the impacts from the constructed features would be to either swamp habitats or BLH. There would be a direct removal of 1,112 acres of swamp habitats and 123 acres of BLH habitats. Using a WVA under the intermediate sea level scenario the project would be required to mitigate for a direct loss of 595.3 AAHUs of swamp and 95.5 AAHUs of BLH. In addition to the direct removal of acres of habitat due to construction, the project would enclose 8,432 acres of swamp and 89 acres of BLH.

Hydrologic connectivity would be maintained to the extent practicable through water control structures except during closure for hurricanes or tropical storms. When the system is closed, pumps would operate on average for 1.7 storms per year, which equates to a closure of structures on average 8.5 days per year. This expected rate of closure would be the same regardless of the actual rate of RSLR as closure of the system is tied to tropical storm events and the elevation trigger would be adjusted as sea level rises. The risk reduction system is only authorized to address storm surge caused by hurricane and tropical storm events. It is not authorized to mitigate for or reduce impacts caused by higher day-to-day water levels brought about by increases in sea level rise. Rainfall events and high tides could still cause significant flooding of the swamps within the levee-enclosed area. All drainage features through the levee system were sized to match the existing gravity drainage system, and would mimic the existing drainage patterns when the system is not closed. Any operational changes implemented to address changing SLR conditions or for any other non-project-related purpose would be considered a separate project purpose requiring separate authorization, new NEPA documentation, and/or permit approvals.

As stated above the pumps would only operate on average for 1.7 storms per year, but the NFS has an obligation relating to the operation of the project, specifically pump station capacities, to prevent encroachments that would impact the utility of the project when the pump station is operating. The NFS will be required to comply with flood plain management requirements and ensure that project features such as pump stations would not be impacted by developments in the areas behind the risk reduction system. The pump system designed to match the existing gravity drainage capacity when the system is closed. The NFS would have a responsibility to ensure that this operation of the project features is maintained.

The levee is designed to maintain hydrologic connectivity to the extent practicable. In order to minimize a reduction in efficiency of drainage affecting water quality and increased impoundment on the protected side of the system, the levee design includes drainage structures and canals located on both the flood side and protected side of the levee. In order to mitigate for any impacts caused by the potential delay in water movement, the team developed a WVA that accounts for delays in water movement. Because 366 acres of the total 455 acres of enclosed BLH is already impacted by existing roadways and railroad tracks, the BLH indirect impacts were calculated to total 89 acres. Using a WVA under the intermediate RSLR scenario, the project would have to mitigate for the indirect loss of 494.5 AAHUs of swamp and 3.1 AAHUs of BLH. The project would also be required to mitigate for a direct loss of 595.3 AAHUs of swamp and 95.5 AAHUs of BLH. The total required mitigation for both the direct and indirect impacts from the construction of the risk reduction levee system is 1,188.03 AAHUs.

Localized Storm Surge Risk Reduction Measures

The Recommended Plan includes localized storm surge risk reduction measures for structures in the communities of Gramercy, Lutcher and Grand Point, which are located outside of the proposed levee system (Figure 5-2). These localized storm surge risk reduction measures focused on addressing existing damages in St. James Parish, while still being economically justified and environmentally compliant. See Chapter 3.9 and Appendix E for information concerning plan formulation and design of the localized storm surge risk reduction measures. These measures include berms and flapgates on existing drainage and roadway features. Flood proofing measures (e.g. raising of certain residential structures and construction of smaller berms around certain individual non-residential structures) are limited to a few structures located outside of the larger localized storm surge risk reduction measures. All of the measures focus on providing a risk reduction above the 1% probability storm stages in 2020. The NFS will be required to maintain these features to their initially constructed design height for so long as the project remains authorized. The future level of risk reduction is dependent on the actual rate of RSLR.

Gramercy Area

In the Gramercy and Lutcher area, north of Hwy 3125, a 10,100 LF berm would be built to provide risk reduction to 275 structures, herein referred to as "**Polder 1 (Gramercy Berm)**." The berm would be constructed to a 6.5' NAVD 88 elevation. The berm in 2020 would provide risk reduction above the 1% probability storm stages. Storm stages in St. James Parish are below +6.5' NAVD 88 elevation in 2020. As discussed in Chapter 3, in the future, the berm's effectiveness depends on the actual rate of RSLR. .

The berm would parallel both sides of Hwy 20, and parallel the railroad track along US-61 (Airline Highway). To the south, the berm would tie into Hwy 3125 to close off the system. Hwy 3125 is key feature for all of the localized storm surge risk reduction features. The entire roadway is above 6.5' NAVD 88 elevation and will be used as a tie in point for the berm. The design of the berm is based on a 4' wide crown and 3:1 side slopes. Using local Light Detection and Ranging (LIDAR) data, it was assumed that the existing ground elevation under the berm would be at an elevation of approximately 4.3' NAVD 88. Using this assumption, the proposed berm would have an average height of 2.2' with an average width of 18' , and require 237,000 cy of compacted fill for construction. The berm would also include two floodgates to allow existing drainage to flow through the berm when not under surge events. A pump system to operate and remove rainwaters during tropical/hurricane storm events will be included in the features. The pump system will be approximately 217 cfs. The berm would be placed in a location so as not to interfere with existing local drainage.

In reviewing the berm footprint there is a risk of affecting approximately 0.29 acres of forested wetlands. Attempts would be made to avoid these areas during construction. Due to the current uncertainty in avoiding these areas, we have included costs for mitigating for these forested wetlands in the total construction cost.

Grand Point Area

In the Grand Point area, north of Hwy 3125, the Recommended Plan includes one berm, "**Polder3 (Grand Point North**)". Polder3 (Grand Point North) would provide risk reduction to 71 structures. The berm would be a complete ring around the structures in the northern portion of Grand Point, near the Grandpoint Boat Lunch. The berm would be 10,400 LF, and would include a 4' wide crown and 3:1 side slopes. The berm would be constructed to a 6.5' NAVD 88 elevation. Initially, in 2020 the berm would provide risk reduction above the 1% probability storm stages. Storm stages St. James Parish are below a 6.5' NAVD 88 elevation in 2020. Future level of risk reduction is dependent on the actual rate of RSLR.

Using local LIDAR data it was assumed that the existing ground elevation under the berm would be approximately 4' NAVD 88. Using this assumption, the proposed berm would have an average height of 2.5' with an average width of 20', and require 286,800 cy of compacted fill for construction. The berm would also

include one floodgate to allow existing drainage to flow through the berm when not under surge events. A pump system to operate and remove rain waters during tropical/hurricane storm events will be included in the features. The pump system will be approximately 140 cfs. The berm would be placed in a location so as not to interfere with existing local drainage. The berm would also be placed very near the edge of the property owners' parcels where feasible. This would minimize the loss of use of any property.

In reviewing the berm footprint there is a risk of affecting approximately 0.81 acres of forested wetlands. Attempts would be made to avoid these areas during construction. Due to the current uncertainty in avoiding these areas, we have included costs for mitigating for these forested wetlands in the total construction cost.

Flood Risk Reduction Under LA Highway 3125

In addition to the berms north of Hwy 3125, the Recommended Plan is to use 13 miles of Hwy 3125 and its existing foundation as a localized storm surge risk reduction feature. Currently the roadway elevation is above 6.5' NAVD 88 in elevation. Currently, the 1% probability storm stages in 2020 flow through the culverts under the roadway in the opposite direction from natural drainage. By closing off the culverts with one-way flap gates and a drainage canal with a floodgate during surge events, the plan would provide risk reduction to 19,500 acres and 4,295 structures south of Hwy 3125. Although there are a limited number of structures that are impacted by the 1% probability storm stages, this closure reduces the risk of a large portion of the parish's critical sugarcane crops from flooding from this type of storm surge event. If the parish in the future makes improvements to Hwy 3125, any additional height added to the entire highway could add to the structures risk reduction level behind the highway. Due to the fact that the roadway is being used as a flood risk reduction feature, the local sponsor will be required to maintain the system's initial level of risk reduction. This includes the berm tie in points to the roadway and 13 miles of the roadway. If the roadway requires maintenance and would be degraded below its original elevation, the work should take place outside of hurricane season. If it is not possible to work outside of hurricane season, interim flood risk measures should be implemented to maintain the original level of risk reduction provided by the roadway.

The Recommended Plan includes 145 flap gate closures, two floodgates and two small berms (Noranda and Uncle Sam). The Noranda berm ties the highway into high ground east of Gramercy. The Uncle Sam berm divides the developed area behind Hwy 3125 from an area that is primarily agricultural land. By dividing these two areas, the local community can focus its reduction efforts in the future. Future improvements could be focused on sections of the highway that have structures behind the highway, approximately 7 miles vs. 13 miles. The area west of the Uncle Sam berm includes an area of 8,175 acres, but only includes one structure that has a first floor elevation below the 1% probability storm stages. The total length of the berms is approximately 645 LF.

Due to the nature of the flooding south of Hwy 3125, it is assumed that the 19,500 acres would have ample storage capacity to hold any rainfall during the surge events. Even if some acres of crops are flooded from rainfall, it would be much less severe than if storm surge was allowed to flow under Hwy 3125.

Remaining Structures in St. James Parish

Eighty structures were evaluated outside of the economically justified and unjustified berms. Only 23 of the 80 structures have a first floor elevation below the 1% probability storm stages in 2020. Based on this evaluation the Recommended Plan includes 14 residential structures that would be raised to the stage associated with the 2070 intermediate RSLR 1% probability storm stages; 4 non-residential structures would be flood proofed to 3 feet above the ground elevation; and smaller berms would be constructed for 5 light industrial/warehouse facilities. The 14 residential structures are being raised to the 2070 height because it is more cost effective to raise a home once.

The incremental first cost for the levee system in the Recommended Plan is $676,598,000. The incremental first cost for the localized storm surge risk reduction system in the Recommended Plan is $41,493,000. The total first cost for the Recommended Plan is $718,091,000.

5.2 Hazardous, Toxic, and Radioactive Waste

The USACE is obligated under Engineer Regulation (ER) 1165-2-132 to assume responsibility for the reasonable identification and evaluation of all Hazardous, Toxic, and Radioactive Waste (HTRW) contamination within the vicinity of proposed actions during the feasibility phase. ER 1165-2-132 identifies that HTRW policy is to avoid the use of project funds for HTRW removal and remediation activities. An ASTM E 1527-05 Phase 1 Environmental Site Assessment, HTRW 14-02 dated February 28, 2014, has been completed for the project area and can be found in Appendix A. The probability of encountering HTRW for the proposed action is low based on the initial site assessment. If no recognized environmental conditions are identified in relation to the project site, the probability of encountering HTRW for this project will be considered low. If a recognized environmental condition is identified in relation to the project site, the U.S. Army Corps of Engineers, New Orleans District would take the necessary measures to avoid the recognized environmental condition so that the probability of encountering or disturbing HTRW would continue to be low. Any further investigations for HTRW that occur after the feasibility phase are the responsibility of the NFS and are subject to a credit against the non-federal proportionate share of total project cost. Any response measures to relocate or mitigate HTRW materials are the sole responsibly of the NFS.

5.3 Adaptive Management & Monitoring (AM&M)

AM&M activities in the mitigation plan address ecological and other uncertainties that could prevent successful implementation of mitigation project measures. The AM&M Plan establishes a framework for decision-making that utilizes monitoring results and other information, as it becomes available, to update project knowledge and adjust mitigation management actions through adaptive management. Integration of AM&M into the mitigation project ensures success under a wide range of conditions and enable implementing corrective actions in cases where monitoring demonstrates that the mitigation project or measures are not achieving ecological success. An AM&M plan was developed and included as part of the mitigation plan. Additional information is located in Appendix A, Annex K.

5.4 Real Estate Requirements Associated with the Recommended Plan

A Real Estate Plan (REP) describing the real estate requirements and costs for the project can be found in Appendix C. The CPRAB will have the responsibility of acquiring all necessary real estate interests for the project and for ensuring that relocation of utilities and facilities are accomplished. The Non Federal contribution of Land, Easements, Rights-Of-Way, Relocation, and Disposal Areas (LERRD) for this project is estimated to be $26,559,000 which includes the costs associated with acquisition of real estate interests for structural features, non-structural features, and mitigation. In addition, as part of the NFS responsibility to provide LERRDs for the project, the NFS is responsible for 100% the cost of facility and utility relocations which is estimated at a total first cost of $19,497,000. Because pipelines will be relocated in place, there will be no acquisition of real estate interests required for the proposed relocations for the project. NFS relocation costs are construction costs; these are discussed below in Section 5.5 of this chapter and are also discussed in Section XV of the Real Estate Plan (Appendix C of this report). Administrative Federal costs of acquisition oversight and review of Non Federal Sponsor work products is estimated to be $1,120,000.

The estimated cost of real estate acquisition for structural features is $5,481,000. This does not include the cost of real estate required for mitigation, which is discussed below. This estimate includes costs associated with acquisition of real estate rights for the levee/T-Walls/gates, access, staging, drainage canals, and pump stations. These project features impact approximately 34 owners. A standard perpetual Flood Protection Levee easement will be acquired for the construction of levees and floodwalls. A standard Drainage Ditch Easement would be acquired for the areas needed for the conveyance canal. Fee Excluding Minerals (with Restrictions on Use of the Surface) will be acquired for the pump stations. The structural project features impact wetlands, vacant woodlands & agricultural lands. Borrow material for this project would come from the Bonnet Carré Spillway, which is owned in fee by the Federal Government. A standard Temporary Work Area Easement will be acquired for staging areas. A non-material deviation will be made to the standard Road

Easement to revise the rights necessary for a temporary Access Easement to be acquired over existing private roads to allow access to the construction area.

The estimated cost of real estate acquisition for the berm features is $3,521,000. Approximately 108 landowners may be impacted by these features. The features entail acquisition of real estate interests to construct a berm in two distinct residential locations. The berms will be constructed in the rear of properties in order to minimize impacts. No structures will be impacted by the berms. For these project features, a non-standard Berm Easement will be acquired. This is a non-material deviation from the standard Flood Protection Levee Easement. In addition, a non-standard estate will be acquired for project features which lie within the ROW of Hwy 3125. This is further discussed in Appendix C, Real Estate Plan.

The localized storm surge risk reduction project features also include elevation of 14 residential structures and flood proofing of 9 commercial structures. The estimated administrative cost associated with implementation of the elevation/commercial flood proofing is $545,000. Property owner participation in the individual localized storm surge risk reduction measures will be completely voluntary. A Flood Proofing Agreement will be executed between the property owner and the Non-Federal Sponsor. It is expected that occupants will need to temporarily relocate from the residence while it is being elevated. Because participation in the elevation of dwellings is voluntary, owner-occupants are not eligible for relocation assistance as indicated in 49 CFR Part 24. No relocation is necessary for flood proofing commercial structures.

Mitigation land will be acquired in Fee, Excluding Minerals (With Restrictions on Use of the Surface). Six sites have been identified for acquisition for mitigation. The sites are located in St. James, Ascension and Livingston Parishes. The properties impacted are currently used for agriculture and recreation; four of the sites in St. James Parish have potential for use as residential and commercial properties. An additional site is within the Bonnet Carré Spillway which is federally owned. As indicated in the 19 September 2006 CECW-P/CECC-G Memorandum, Subject: Cost Sharing for Lands Associated with Fish and Wildlife Mitigation, it is noted that real estate costs for mitigation should be allocated among authorized project purposes and should not be included in real estate costs for lands and damages. This is noted within the Chart of Accounts in Annex C of the Real Estate Plan, and mitigation costs are separated from other real estate costs. The total cost of real estate for mitigation is $18,132,000.

5.5 Relocations with the Recommended Plan

Levee construction may cause relocations and/or temporary interruptions to pipelines. Relocations are a part of the NFS LERRDs responsibility. The assumption for the Recommended Plan was that a pipeline floodwall would be required wherever a pipeline crossed the levee footprint. The pipeline would cross through a cutoff wall under the pipeline floodwall. It was decided that the existing carrier line would remain in operation while a bypass line would be constructed through a sleeve in the T-wall cutoff piles. When the bypass would be completed and in place, the switch over-tie in with the existing line then would follow along with the removal of the abandoned pipeline. These assumptions are consistent with the screening level assumptions. For the Recommended Plan, it was assumed the pipeline would be relocated for the full right-of-way width of the proposed levee to accommodate the proposed protected side canal and the unprotected side ditch. A pipeline relocation length of 600 feet was used versus the widest right-of-way of 541 feet. Although no determination of compensability was prepared for purposes of this Report, it is expected that all of the pipeline relocations would be compensable. The total costs for relocations are estimated to be $19,497,000, and are the responsibility of the NFS. Relocation costs include construction costs only, as there are no lands required for relocations.A final determination of compensability for utility/common carrier relocations will be refined during final design.

5.6 Operation and Maintenance, Repair, Rehabilitation and Replacement associated with the Recommended Plan

The purpose of operation and maintenance, repair, rehabilitation and replacement (OMRR&R) is to sustain the constructed project. The total estimated annual OMRR&R cost is $5,070,000 based on the current

Federal FY2015 Fiscal year discount rate (3.375%). A majority of the annual OMRR&R costs are based upon sustaining the levee system, but also include costs for sustaining the flap gates along Hwy 3125 and maintaining the berms around groups of residential structures. The NFS will be required to maintain these features to their initial constructed design height for so long as the project remains authorized. As stated in section 5.1, the NFS is not obligated to address loss of risk reduction due to RSLR through future berm lifts or highway lifts, but they will still be required to repair, rehabilitation or provide replacement of components associated with the construction of berms and flap gates to maintain the original project benefits. The NFS will also not be obligated to OMRR&R the flood proofing measures that constitute elevation of individual residential structures or construction of small ring berms around individual non-residential or light industry/warehouse structures. After the District Engineer provides notice of construction completion for the project, or functional portion of the project, the CPRAB will commence OMRR&R responsibilities associated with the project.

5.7 Benefit Analysis associated with the Recommended Plan

Project Benefits

Net benefits are based on the following benefit categories: residential and commercial (structure/content/vehicles), and industrial (structures/contents). Costs and benefits for each Recommended Plan are shown in table 5-6. The table provides the final recommendation in both the Federal FY2014 Fiscal year discount rate (3.5%) and the FY2015 discount rate (3.375%).

Table 5-1 Total equivalent annual net benefits by component

(Oct. 2014 Price Level; Discount Rate: 3.5%; $Millions)				
Component	**Equivalent Annual Benefits (EAD)* (Damages Reduced)**	**Total Annual Costs**	**Equivalent Annual Net Benefits**	**Benefit-to-Cost Ratio**
Levee System	87.9	32.1	55.7	2.74
Localized Storm Surge Risk Reduction System	5.4	2.4	3.0	2.23
Recommended Plan** (Levee & Localized Storm Surge Risk Reduction System)	97.2	34.6	62.6	2.81
(Oct. 2014 Price Level; Current Discount Rate: 3.375%; $Millions)				
Recommended Plan (Levee & Localized Storm Surge Risk Reduction System)**	**97.8**	**34.0**	**63.8**	**2.88**

* Benefits to highways, streets, and debris removal and cleanup were not included in the final evaluation due to the fact that they would only account for a small portion of the total benefits attributable to the project and not affect the plan selection. Individual components were run separately and incorporated risk (Monte Carlo simulations). Due to the randomness associated with risk simulations; EAD totals for each system will not yield the exact same EAD as the Recommended Plan.
** Based on calculations including future development.

5.8 Risk & Uncertainty Analysis associated with the Recommended Plan

Risk and uncertainty are intrinsic in water resources planning and design. This section describes various categories of risk and uncertainty pertinent to the study.

5.8.1 Residual Damages and Residual Risks

Residential, Commercial, and Industrial Damages: With a project in place to reduce hurricane and tropical storm surge damages, not all surge damages will be prevented, only reduced. It is important to provide information on residual damages to demonstrate project performance and communicate the fact that the

project will not eliminate all risks to life and property. In both the levee system and localized storm surge risk reduction system, residual damages can still occur from project exceedance events, rainfall events, and hurricane winds and windblown debris. The study area is still highly susceptible to rainfall flooding, particularly in upland areas where drainage features are restricted by railway or roadway features. As stated in Section 5.1, the recommended risk reduction system is only authorized to address storm surge caused by hurricane and tropical storm events. It is not authorized to mitigate for or reduce impacts caused by higher day-to-day water levels brought about by increases in sea level rise or by rainfall events outside of hurricane and tropical storm events.

The Hydrologic Engineering Center Flood Damage Analysis (HEC-FDA) Version 1.2.5a certified model was used to calculate the damages for the without project existing and future conditions. Measurable damage categories from HEC-FDA including residential and non-residential structures and automobiles are accounted for in the residual damages. Table 5-2 shows the equivalent average annual remaining damages provided as output under the HEC-FDA model.

Table 5-2
Equivalent Annual Residual Damages - By Components of Recommended Plan

Component	Total Equivalent Annual Residual Damages[1] (2014 Price Level)
Levee System	
SA 1- SA44C Reaches (behind Alt C Levee System)	$25,771,167
Localized Storm Surge Risk Reduction System	
Polder 1 (Gramercy Berm)	$1,100,617
Polder3 (Grand Point North)	$505,812
Storm Surge Risk Reduction Under LA Highway 3125	$2,668,102
Remaining Structures in St. James Parish	$192,919

[1]Includes impacts to existing structures for the areas behind the levee system. Note that the values presented in this table are from HEC-FDA outputs and subject to variations in the Economic Appendix due to the assumptions on future development.

The recommended plan would greatly reduce the equivalent annual storm surge damages in areas behind Alternative C. The project is designed to reduce two different levels of hurricane and tropical storm surge damages over the 50-year period of analysis.

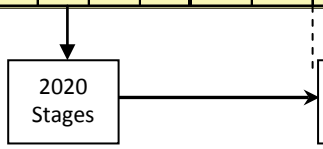
The levee system is based on a 1% probability storm level of risk reduction and a 2020 intermediate RSLR condition. Over a 50 year period, the system would be maintained to a 1% probability storm level of risk reduction system with future levee lifts based on the 2070 intermediate RSLR conditions. The levee system will reduce hurricane and tropical storm surge damages by 74 percent to the existing structures behind the levee system over a 50 year period. As stated in section 5.1, the levee system is not authorized to be closed under non-hurricane and tropical storm events. Some damages will still occur from rainfall events and from storms exceeding the systems 1% probability storm level of risk reduction.

The localized storm surge risk reduction system is based on a 1% probability storm level of risk reduction under the 2020 intermediate RSLR conditions. The NFS will maintain the localized storm surge risk reduction features to their initially constructed design height to maintain initial level of risk reduction, but the

future level of risk reduction is dependent on the actual rate of RSLR. Table 5-3 shows the potential level of change over time based on the intermediate RSLR condition. The table shows the reaches (Sub-Planning in Table 5-3) that are included in this system. The system focuses on reducing storm surge damages below the 1% probability storm stages in 2020. Table 5-3, column "2020 SWL0100YR" shows the surface water level for the 1% frequency storm. The table shows that based on an intermediate RSLR condition, the level of risk reduction would change from the 1% probability storm stages in 2020 to somewhere between a 10% event (2070 SWL0025YR) and 4% event (2070 SWL0050YR) by 2070.

Table 5-3
2020 and 2070 Storm Stages - By Components of Recommended Plan

Sub-Planning				2020 Intermediate Sea Level Rise								2070 Intermediate Sea Level Rise							
SA-Name	Id	Index_Sta	IN_OUT	SWL0001y	SWL0005y	SWL0010y	SWL0025y	SWL0050y	SWL0100y	SWL0200y	SWL0500y	SWL0001y	SWL0005y	SWL0010y	SWL0025y	SWL0050y	SWL0100y	SWL0200y	SWL0500y
RSA 02	2	104	1	*1.2*	*1.4*	*3.0*	*3.9*	4.7	5.7	6.6	7.6	*3.4*	*3.6*	*5.2*	*6.1*	9.7	11.7	13.4	15.3
RSA 24	24	148	1	*1.2*	*1.4*	*3.0*	*3.9*	4.5	5.4	6.3	7.3	*3.4*	*3.6*	*5.2*	*6.1*	9.7	11.5	13.4	15.4
RSA 27	27	154	1	*1.2*	*1.4*	*3.0*	*3.9*	4.6	5.6	6.5	7.5	*3.4*	*3.6*	*5.2*	*6.1*	9.6	11.6	13.3	15.3
RSA 33	33	166	1	*1.2*	*1.4*	*3.0*	*3.9*	4.3	5.1	5.9	6.8	*3.4*	*3.6*	*5.2*	*6.1*	9.9	11.7	13.5	15.6
RSA 34	34	168	1	*1.2*	*1.4*	*3.0*	*3.9*	4.3	5.1	5.9	6.8	*3.4*	*3.6*	*5.2*	*6.1*	9.9	11.7	13.5	15.6
RSA 35	35	170	1	*1.2*	*1.4*	*3.0*	*3.9*	4.3	5.1	5.9	6.8	*3.4*	*3.6*	*5.2*	*6.1*	9.9	11.7	13.5	15.6
RSA 36	36	172	1	*1.2*	*1.4*	*3.0*	*3.9*	4.6	5.6	6.5	7.5	*3.4*	*3.6*	*5.2*	*6.1*	9.6	11.6	13.3	15.3
RSA 41	41	182	1	*1.2*	*1.4*	*3.0*	*3.9*	4.3	5.1	5.9	6.8	*3.4*	*3.6*	*5.2*	*6.1*	9.9	11.7	13.5	15.6
RSA 44	44	188	1	*1.2*	*1.4*	*3.0*	*3.9*	4.5	5.4	6.3	7.3	*3.4*	*3.6*	*5.2*	*6.1*	9.7	11.5	13.4	15.4
RSA 46	46	192	1	*1.2*	*1.4*	*3.0*	*3.9*	4.7	5.7	6.6	7.6	*3.4*	*3.6*	*5.2*	*6.1*	9.7	11.7	13.4	15.3
RSA 54	54	208	1	*1.2*	*1.4*	*3.0*	*3.9*	4.6	5.6	6.5	7.5	*3.4*	*3.6*	*5.2*	*6.1*	9.6	11.6	13.3	15.3
RSA 55	55	210	1	*1.2*	*1.4*	*3.0*	*3.9*	4.5	5.4	6.3	7.3	*3.4*	*3.6*	*5.2*	*6.1*	9.7	11.5	13.4	15.4
RSA 56	56	212	1	*1.2*	*1.4*	*3.0*	*3.9*	4.6	5.6	6.5	7.5	*3.4*	*3.6*	*5.2*	*6.1*	9.6	11.6	13.3	15.3



Although the localized storm surge risk reduction system is based on a limited level of risk reduction, the system would still reduce hurricane and tropical storm surge damages by 55 percent over a 50-year period even with changing sea level rise conditions.

The recommended plan components, when combined, will reduce hurricane and tropical storm surge damages by 73 percent for the existing structures within the risk reduction areas.

Risk to Life and Safety: The main project purpose is to focus on hurricane and tropical storm surge damage reduction. Loss of life is prevented by the existing procedures of evacuating completely well before expected hurricane landfall and thereby removing the residents from harm's way. The erratic nature and unpredictability of hurricane path and intensity requires early and safe evacuation. This policy should be continued both with and without the storm damage reduction project.

5.8.2 Environmental Factors

Relative Sea Level Rise: There is uncertainty about how much SLR change would occur in the region. Higher than estimated RSLR could cause salt-water intrusion into the freshwater swamp causing significant changes to this habitat. An assessment of RSLR was included in plan formulation and alternatives analysis. The evaluation of RSLR is documented in Appendix B. Calculations based on EC 1165-2-212 determined that the initial WSE at the low, intermediate and high rates of RSLR at 2070 are 1.81 feet, 2.32 feet, and 3.95 feet, respectively. The intermediate RSLR rate was applied.

The use of the intermediate scenario was chosen over the historic and high RSLR scenarios, due to the fact that it is the most likely scenario for the WSLP study area, based on the following information and conclusions.

The application of storm surge damage scenarios were not based on just global SLR, but based on the application of a RSLR scenario for SE Louisiana. Subsidence levels predicted in the study area were incorporated into the storm surge model's initial water level parameter to capture the combined effects of subsidence and local SLR into a single RSLR value. In addition, to account for RSLR in the future conditions, all scenarios in the surge modeling accounted for a potential degradation of vegetation related to SLR and subsidence. The damages are mainly driven by the degradation of vegetation in the landscape, not by just an increase in the SLR. There is actually less than a .6 ft difference between the low and intermediate estimated RSLR at year 2070.

Historical empirical data shows that subsidence and landscape changes will continue to be the driving force in changing storm surge conditions in the future. This driving force would exist under all SLR scenarios. In reviewing surge data points, there are limited differences between the low and intermediate scenarios. Based on the limited differences in stages and the historical documentation of subsidence and landscape changes in Louisiana, the project delivery team felt that the intermediate RSLR scenario was the most likely scenario in the future. The high RSLR scenario was not chosen since it represents the most extreme conditions. Under the FWOP conditions, a majority of the developed portions of the study area are flooded under the high scenario.

Also, the use of intermediate sea level scenario for the final presentation of the expected annual without project damages and benefits with the Recommended Plan, is consistent with other recent NED and National Ecosystem Restoration (NER) projects in SE Louisiana. Final design recommendations for the LCA Study and the Morganza to the Gulf Post Authorization Change Study have all been based on the intermediate sea level scenario and accepted as appropriate by the Agency.

The actual future RSLR could impact the benefits achieved by the Recommended Plan. Because the project was developed using the intermediate RSLR rate, the plan would provide more benefits than anticipated should the low RSLR rate result and less benefits with the high RSLR rate. Investigations under the planning formulation phase of the study showed that if a different RSLR occurs before construction, the project could still be modified and still be shown as justified expenditure to the nation

Storms: Risks associated with the Recommended Plan are primarily related to the possibility of extreme weather events. The uncertainty of the size or frequency of storms and meteorological events, such as El Nino and La Nina, cannot be predicted over a set period of time. The storm record is constantly being updated and a large storm such as Hurricane Katrina or a slow moving storm such as Isaac can alter the expected return period for other storms. To reduce the uncertainties of storm events, storms with varying degrees of size, intensity, and path are included in the modeling. By using a long-term record of different storm scenarios, the effects of such storms are incorporated into the modeling. The team is then able to reduce the uncertainty in the determination of project benefits (Appendix B).

5.8.3 Engineering Factors

Levee/Structure Failure: The risk associated with the levee/structure system is its stability. Analysis of the earthen levee and associated T-walls and gates are included in Appendix B. The levee and other features will be constructed to meet USACE standards.

Hydrologic Flows: As discussed in Chapter 3, there is always uncertainty as to whether the levee system would potentially induce flooding. Additional ADCIRC modeling will be performed during PED to determine whether or not there will be induced flooding and to precisely estimate its magnitude. At feasibility level of design, the model uncertainty and inclusion of localized storm surge risk reduction plans adequately address the limited potential for induced damages.

The risk of running the ADCIRC and Steady-State Spectral Wave (STWAVE) models is the assumption that the models appear to provide a specific response on the Recommended Plan in any given scenario; however it is only a representative point of reference in a complex system. While the analysis is enhanced by the models, application of the models can introduce error and uncertainty. Calibration and verification efforts are employed so that the models more closely replicate observed changes or at least provide insight into the limitations of the model.

Models are limited by basic, underlying assumptions and uncertainties. Some of the simplifying assumptions include the model parameters. Sensitivity discussions are included in Appendix B. Another uncertainty is that a limited number of storm scenarios are modeled. It is assumed that various storm scenarios over a number of years will represent a much higher indicator of the levees ability to withstand major storm events.

The models also use available historic data to extrapolate future storm conditions and frequency. The size and frequency of storms included in the model are based on statistical analysis but do not account for meteorological changes, such El Nino and La Nina effects, that can increase or decrease storms over a period of several years. Neither do the models account for the potential of increased storms due to climate change.

5.8.4 Economic Factors

The HEC-FDA Version 1.2.5a certified model was used to calculate the damages for the without project existing and future conditions. Economic and engineering inputs were necessary for the model to calculate damages for existing conditions (2012), the project base year (2020) and the final year in the period of analysis (2070). The inputs included structure inventory, future development, contents-to-structure value ratios, vehicles, first floor elevations and depth-damage relationships, ground elevations and without-project stage probability relationships.

The uncertainty surrounding each of the economic and engineering variables was entered into the model. Either a normal probability distribution, with a mean value and a standard deviation, or a triangular probability distribution, with a most likely, a maximum and a minimum value, was entered into the model to quantify the uncertainty associated with the key economic variables. A normal probability distribution was entered into the model to quantify the uncertainty surrounding the ground elevations. The number of years that stages were recorded at a given gage was entered for each study area reach to quantify the hydrologic uncertainty or error surrounding the stage-probability relationships.

The evaluation incorporated uncertainty surrounding the economic and engineering inputs to generate results that can be used to assess the performance of the Recommended Plan. As presented in Table 48 of the Economic Appendix, there is a greater than a 75 percent chance that the equivalent annual benefits exceeded the annual cost and the benefit-to-cost ratio is greater than one.

5.8.5 Implementation Factors

Subject to project authorization, appropriation and availability of funding, full environmental compliance, and execution of a binding agreement with the non-Federal sponsor, construction is currently scheduled to begin in 2015. The schedule assumes a complete risk reduction system in place by 2020, with additional levee lifts

through 2070 to account for SLR and subsidence impacts. The project requires construction authorization and the appropriation of construction funds. A continuous funding stream is needed to complete this project within the anticipated timeline, which requires continuing appropriations from Congress and the State of Louisiana in order to fund the detailed design phase and fully fund construction contracts.

Once construction funds are appropriated for this project, the CPRAB, as the non-Federal sponsor, and the Department of the Army will enter into a Project Partnership Agreement (PPA). After the signing of a PPA, the non-Federal sponsor can acquire the necessary land, easements and rights of way to construct the project. Since project features cannot be advertised for construction until the appropriate real estate interests have been acquired, obtaining the necessary real estate in a timely fashion is critical to achieving the project schedule. At the completion of construction, or functional portions thereof, the non-Federal sponsor would be fully responsible for OMRR&R of the project or of the completed functional portion of the project.

5.9 Implementation Requirements

5.9.1 Preconstruction Engineering and Design

Detailed design of the WSLP Project will be cost-shared between CPRAB and the USACE contingent upon the execution of a Design Agreement and approval of WIK in accordance with the provisions of ER 1165-2-208. All detailed design will be in accordance with USACE regulations and standards.

5.9.2 Construction and LERRD

Construction would be in accordance with the USACE's regulations and standards. LERRD would be the responsibility of the CPRAB (Appendix C). WIK associated with the construction for both the structural and localized storm surge risk reduction system components of the Project will be negotiated with NFS, contingent upon approval at the Assistant Secretary of the Army for Civil Works (ASACW) or appropriate level in accordance with applicable guidance and regulations.

5.9.3 Cost Sharing

The State of Louisiana, acting through the PLD, is the non-Federal sponsor for the feasibility study. The cost-share during the feasibility phase is 50% Federal and 50% non-Federal. Following the feasibility phase, the CPRAB will be the non-Federal Sponsor for the planning, design, construction, operation, maintenance, repair, replacement and rehabilitation of the project. The cost share for the planning, design and construction of the project will be 65% Federal and 35% non-Federal. The CPRAB must provide all project LERRD required for the project. OMRR&R of the project would be a 100% CPRAB responsibility. A full description of the non-Federal and Federal responsibilities after the feasibility phase of the project is contained in Section 8.2 of this report. The total estimated annual OMRR&R cost is $5,070,000. Table 5-4 presents the cost apportionment.

Table 5-4: Cost apportionment of the Recommended Plan.

	Total	Federal	Non-Federal
PED	$7,500,000	$4,875,000	$2,625,000
Construction	$663,415,000	$460,764,000	$202,651,000
Pipeline Relocations	$19,497,000	-	$19,497,000
Lands, Easements, & ROW	$27,679,000	$1,120,000	$26,559,000
Total First Costs	$718,091,000	$466,759,000	$251,332,000

5.10 Views of the Non-Federal Sponsor

The PLD and the CPRAB support and recognize the importance of hurricane risk reduction in St. Charles, St. John the Baptist and St. James Parishes. A letter of intent from CPRAB indicating their willingness and financial capability has been received. The letter stated the following:

"*The 2012 Comprehensive Master Plan for a Sustainable Coast recommended an alignment most similar to Alternative D, as described in the draft Feasibility/EIS dated August 2013. Although Alternative D was not selected by USACE as the preferred alternative, CPRA recognizes that Alternative C does include a portion of the Master Plan alignment from the Bonnet Carré Spillway to the crossing at Interstate 10. The State also supports protection measures to the west of Alternative C and would like the opportunity to investigate solutions for inclusion of these measures in this project. The State of Louisiana continues to support this critical project and looks forward to working with the USACE on timely implementation.*"

In the letter, the State of Louisiana also acknowledges the responsibilities of the NFS and will support the role as such for the design, construction, and OMRR&R phases of the recommended project, if authorized. However, since the project is within the jurisdictional boundaries of the PLD which is the delegated local statutory entity with responsibility for flood control and hurricane protection in the project area, the State notes its intent to request that the PLD be included as a co-sponsor for the project.

With regard to LERRDs, CPRAB understood that it is the position of the USACE that the localized storm surge risk reduction portion of the plan for the WSLP Project is voluntary, and the landowners are not considered displaced and will not be eligible for Uniform Relocation Assistance (URA) benefits under Title II, P.L. 91-646, as amended.

This study is supported by the Louisiana Congressional delegation. The USACE has worked with an interagency team and local stakeholders to develop a feasible comprehensive plan to provide hurricane storm surge risk reduction for the area. Construction of the proposed system would immediately allow for improved storm surge risk reduction in the three-parish area, which could potentially reduce life, health and safety risk to residents and interruptions to vital transportation routes.

6.0 ENVIRONMENTAL LAWS & COMPLIANCE (*NEPA Required)

Federal projects must comply with environmental laws, regulations, policies, rules and guidance as identified in Appendix A. The team coordinated with Federal and state resource agencies during planning for both the structural and localized storm surge risk reduction system and the mitigation sites. Compliance is achieved upon review of this report by appropriate agencies and the public, and with the signing of a Record of Decision by the Assistant Secretary of the Army for Civil Works.

6.1 Clean Air Act of 1972 (Air Quality)

The Clean Air Act (CAA) sets goals and standards for the quality and purity of air. It requires the Environmental Protection Agency to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The project area includes two mitigation sites within Ascension and Livingston Parishes which are currently designated as ozone non-attainment status for NAAQS. The Louisiana Department of Environmental Quality is required by the CAA and Louisiana Administrative Code, Title 33 to grant a general conformity determination which is located in Appendix A, Annex O.

6.2 Clean Water Act of 1972 – Section 401 (Water Quality)

The Clean Water Act (CWA) sets and maintains goals and standards for water quality and purity. Section 401 requires a Water Quality Certification from the Louisiana Department of Environmental Quality that a proposed project does not violate established effluent limitations and water quality standards. Section 401 correspondence and compliance is located in Appendix A, Annex A.

6.3 Clean Water Act of 1972 – Section 404(b)(1) (Wetlands)

The USACE administers regulations under Section 404(b)(1) of the CWA, which establishes a program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands. A signed 404(b)(1) evaluation, public notice and comments are located in Appendix A, Annex A.

6.4 Coastal Zone Management Act of 1972 (Coastal Zone Development)

The Coastal Zone Management Act is a partnership structure allowing states and the Federal government to work together for the protection of U.S. coastal zones from environmentally harmful over-development. A Coastal Zone Consistency Determination and Findings is located in Appendix A, Annex B.

6.5 Endangered Species Act of 1973 (Threatened & Endangered Species)

The Endangered Species Act (ESA) is designed to protect and recover threatened and endangered (T&E) species of fish, wildlife and plants. The USACE has coordinated with the USFWS and the NMFS to ensure the protection of those T&E species under their respective jurisdictions. The USFWS identified in their January 9, 2009 coordination letter two T&E species, the Gulf sturgeon and the West Indian manatee, that are known to occur or occasionally occur in the project area. There are no listed species in the localized storm surge risk reduction or the mitigation project areas. Incorporated by reference are the LCA Amite report and the associated T&E coordination and the Final PIER #36 report. The farm fields offer potential utilization by the Sprague's pipit. The Sprague's pipit, is a candidate species for federal listing as threatened or endangered. It winters in Louisiana, arriving from northern breeding grounds in September and remaining until April. The USACE will consult with USFWS when the species is listed. No plants were identified as being threatened or endangered in any project area or mitigation site. Based on review of existing data and preliminary field surveys, the USACE finds that implementation of the Recommended Plan is not likely to adversely affect any listed species or their critical habitat. ESA coordination with USFWS and NMFS is concluded. See Appendix A, Annex N.

6.6 Bald and Golden Eagle Protection Act of 1940 (Bald Eagles)

The Bald and Golden Eagle Protection Act protects two eagle species. Bald eagles occur or occasionally occur in the project area. Based on review of existing data and preliminary field surveys, the USACE finds that implementation of the Recommended Plan would have no effect on bald eagles.

6.7 Louisiana State Threatened and Endangered Species and Rare and Unique Habitat

The Louisiana Department of Wildlife and Fisheries (LDWF) Louisiana Natural Heritage Program (LNHP) lists T&E species, and rare, unique and imperiled habitats in Louisiana. Based on review of the LNHP online database, for rare or unique cypress-tupelo swamp habitat, bald eagles, alligator snapping turtles, osprey, paddlefish, manatees, swamp milkweed, floating antler fern and rooted spike-rush are found in the project area (LDWF 2013).

6.8 Colonial Nesting Water Birds

The USFWS indicated in a January 9, 2009, coordination letter that the project area supports colonial nesting water birds (e.g., herons, egrets, ibis, night-herons and roseate spoonbills). Based on a review of existing data and preliminary field surveys, the USACE finds that implementation of the Recommended Plan would have no impact on colonial nesting water birds. The best management practices (BMPs) listed in Appendix A, Annex N and USFWS recommendations would be followed in order to avoid impacts. Implementation of the proposed project would require compensatory mitigation for unavoidable project-induced potential impacts to colonial nesting water bird habitat.

6.9 Farmland Protection Policy Act of 1981 (Farmland)

The Farmland Protection Policy Act (FPPA) is intended to minimize the impact of Federal programs on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Projects are subject to requirements if they may irreversibly convert farmland to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency. In its review of the proposed project the NRCS determined that the Recommended Plan will impact 404 acres of lands classified as prime farmland and that the project will not impact NRCS work in the vicinity. No actions will be taken to avoid impacts to farmland. USACE coordination letters and responses from NRCS are found in Appendix A, Annex E.

6.10 Fish and Wildlife Coordination Act of 1934 (Fish & Wildlife)

The Fish and Wildlife Coordination Act (FWCA) provides authority for USFWS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It requires Federal agencies that construct, license or permit water resource development projects to first consult with the USFWS, NMFS and state resource agencies regarding the impacts on fish and wildlife resources and measures to mitigate these impacts. Section 2(b) requires the USFWS to produce a Coordination Act Report (FWCAR) that details existing fish and wildlife resources in a project area, potential impacts due to a proposed project and recommendations for a project. The final FWCAR dated April 28, 2014 includes the USFWS positions and recommendations. This document, USACE's responses and coordination planning aid letters are found in Appendix A, Annex G.

The USFWS, through coordination efforts, provided a map depicting colonial nesting waterbird (e.g., herons, egrets, ibis, night-herons, and roseate spoonbills) rookeries in the area. Two potentially active rookeries may exist within 1,000 feet of the proposed structural alignment. No rookeries have been identified in the vicinity of the berm alignments or the mitigation sites. USFWS and USACE biologists will survey the area before construction to confirm active rookery locations. If active rookeries exist within 1,000 feet of an alignment, this could be a project constraint. USFWS guidelines would be followed to avoid adverse impacts to birds.

A January 29, 2009, NMFS letter indicates that aquatic and wetland habitats in the area include estuarine emergent wetlands, submerged aquatic vegetation, mud substrates, and an estuarine water column. These habitats provide EFH for white shrimp and red drum. Waterbodies and wetlands provide nursery and foraging habitats for a variety of fish species, some of which may serve as prey for other fish species designated as EFH species (e.g., mackerel, snapper and grouper) and highly migratory fishes (e.g., billfish and sharks). The NMFS letter indicates the area provides foraging and nursery habitat for economically important marine fishery resources including striped mullet, Atlantic croaker, blue crab, and Gulf menhaden. In addition to providing habitat for species with designated EFH, the area is important for Federal and state-managed species. It provides foraging and nursery areas for prey species (gulf menhaden and bay anchovy) (Penland et

al. 2002) eaten by predators, such as sand seatrout, spotted seatrout, catfish and crappie (LDWF 2009, Hastings 2001), and highly migratory species.

As set forth in the FWCAR, the Service Position and Recommendations are:

The Service would prefer to see selection of the least environmentally damaging alterative which is Alternative A. However, we recognize and understand the logic and reasoning for selecting Alternative C, which includes avoidance of the costly relocation of pipelines and utilities and is expected to provide additional storm water storage capacity for exceedence events thus decreasing the flooding potential of nearby developed areas. Construction of Alternative C will result in the direct loss of approximately 1,236 acres (-691 AAHUs) of swamp and BLH and encloses 8,521 acres (-498 AAHUs) of valuable swamp habitat for a total of 9,757 acres (-1189 AAHUs) of direct and indirect acres.

The Service's Mitigation Policy (Federal Register, Volume 46, No. 15, January 23, 1981) identifies four resource categories that are used to ensure that the level of mitigation recommended by Service biologists will be consistent with the fish and wildlife resource values involved. Considering the high value of forested wetlands for fish and wildlife and the relative scarcity of that habitat type on a basin-wide scale, that habitat type is designated as Resource Category 2, the mitigation goal for which is no net loss of in-kind habitat value.

For those features that undergo additional design work during the Pre-construction Engineering and Design phase (PED) the Corps should coordinate that work with the Service and other natural resource agencies in accordance with the FWCA. Funding for such work may also be necessary.

USACE RESPONSE: Concur. The USACE will coordinate additional design work during PED with the USFWS and other Federal and State resource agencies, as well as with the non-Federal Sponsor. Funding for the USFWS to participate in this effort will be provided consistent with the Fish and Wildlife Coordination Act.

We appreciate the Corps' consideration of our recommendations below for the WSLP project. Provided that the below recommendations are included and adequately addressed in the final feasibility report and pending our review of the adaptive management component of the mitigation plan and resolution of any additional recommendations, the Service does not oppose implementation of the TSP.

The Service respectfully requests the following recommendations are implemented concurrently with project implementation:

1. The Service and LDWF recommend that the unavoidable direct and indirect (including hydrologic) impacts (approximately 446 acres and -123 AAHUs of total WMA impacts) to the wetlands within the Maurepas Swamp WMA be mitigated on the WMA lands, specifically by making hydrologic improvements as well as replacement of lost swamp.

a. In the Corps' Blind River Swamp Restoration Project (SWAMP2) mitigation plan it states that the Corps intends to "Verify that the Livingston Parish Coastal Impact Assistance Program (CIAP) project was built, and that those hydraulic modifications when combined with this planting plan will produce the proposed AAHUs." The Service and LDWF recommend the Corps state that if the hydraulic modifications are not made (or only partially made) as part of the proposed CIAP project that the SWAMP2 mitigation will include the hydraulic modifications as a project feature with detailed engineering, adaptive management and monitoring to be developed during the PED phase. The Service and LDWF recognize that since this feature may not be part of the mitigation plan, adaptive management and monitoring plans do not need to be developed at this time.

b. We recommend that the Corps continue coordination on the proposed mitigation with LDWF and the Service throughout further development and design.

USACE RESPONSE: If the hydraulic modifications are not made (or only partially made) as part of the proposed CIAP project USACE will collaborate with the NFS and the resource agencies to develop new mitigation plans. This could include the required the hydraulic modifications to obtain the required AAHUs at the SWAMP2. USACE will continue to coordinate with the USFWS and other Federal and State (LDWF) resource agencies, as well as with the Non-Federal Sponsor.

2. Over 8,000 acres of swamp will be enclosed within the levee of Alternative C. The proposed alternative may alter natural periods of inundation or soil saturation in the impounded wetlands and could prove detrimental to their function and longevity. Therefore, the Service recommends;

a.That because of our concern about the limited number of proposed culvert openings not being adequate to maintain existing water exchange in regard to water depth, delays in water movement, and impacts to water quality; the Corps undertake, if necessary, the installation of additional culverts and/or water control structures in the levee to ensure adequate water exchange while maintaining that all structures should be closed only in advance of tropical storms.

USACE RESPONSE: Feasibility-level modeling indicates that the number of culverts and water control structures would provide adequate water exchange except when the structures are closed in advance of and during tropical storm events. Additional detailed examination of culvert and water control structures design and operations will be conducted during PED. The USACE will coordinate this more detailed design and operational development with the USFWS, other resource agencies and the Non-Federal Sponsor. The risk reduction system is only authorized to address storm surge caused by hurricane and tropical storm events. It is not authorized to mitigate for or reduce impacts caused by higher day-to-day water levels brought about by increases in sea level rise. Any operational changes implemented to address changing RSLR conditions or for any other non-project-related purpose would be considered a separate project purpose requiring separate authorization, new NEPA documentation, and/or permit approvals.

b. That hydrologic gauges be placed and maintained in appropriate locations to assist in determining future impacts to enclosed swamps. These gauges could be supported or cost-shared through existing activities such as through the US Geological Survey (USGS) or CRMS.

USACE RESPONSE: Determination of number and locations of hydrologic gauges will be developed during PED phase and is part of the overall O&M cost. Gauges will be placed in appropriate locations to monitor the need to open and close the system. USACE does not intend to monitor swamps located on the protected side of the levee as such activity would fall outside of the project purpose and outside of any project authorization. Any unavoidable impacts to these wetlands will be compensated for through construction of various mitigation features within the basin as described in the mitigation plan (see Appendix A, Annex K).

c. To aid in water quality improvements, any pumping stations associated with the project should not discharge directly into canals or other open water bodies, but rather into wetland systems that can assimilate nutrients being discharged.

USACE RESPONSE: All pump station or drainage structure locations will be connected to a flood side ditch and a protected side canal parallel to the entire levee. The canal will maintain existing connection between swamps inside and outside of the levee system. The protected side canal will serve as a redundant connection if a pump station fails.

3. Operational plans for floodgates and water control structures should be developed to maximize the open cross-sectional area for as long as possible. Development of water control structure operation manuals or plans should be done in coordination with the Service and other natural resource agencies.

USACE Response: Operational plans for floodgates and water control structures will be developed before construction to maximize the connectivity between wetlands located inside of the levee system to those located outside of the levee system. More detailed development of floodgate and water control structures will be conducted during the PED phase. During the PED phase and construction Phase, the USACE will continue to coordinate detailed project developments with the USFWS, other resource agencies and the NFS.

4. The trigger for structure closures would be tropical storm events. Therefore, the project would not close the system more often due to higher day-to-day sea level rise impacts. If the sponsor/operator sees a higher level of sea level rise and starts to see increased soil saturation/flooding in developed areas, they may want to change the operations to close the structures at high tides. A change in operations would be considered a separate project purpose and authorization and would require a new NEPA documentation and/or a permit approval for this operation change. If a change in operation due to RSLR is realized, it is unknown at present, how water levels within the system would be managed so there is a potential for substantial additional indirect impacts to swamp and fish and wildlife resources to occur. If the system is closed more often due to higher RSLR impacts, the Service recommends additional impacts be evaluated and mitigated.

USACE RESPONSE: Concur, the risk reduction system is only authorized to address storm surge caused by hurricane and tropical storm events. It is not authorized to mitigate for or reduce impacts caused by higher day-to-day water levels brought about by increases in sea level rise. Any operational changes implemented to address changing RSLR conditions or for any other non-project-related purpose would be considered a separate project purpose requiring separate authorization, new NEPA documentation, mitigation and/or permit approvals.

5. The Service recommends preservation of enclosed wetlands be ensured (in perpetuity) via the purchase of non-development easements and local flood zoning ordinances. Providing perpetual preservation of enclosed wetlands would also guarantee flood storage areas within the levee system.

a. If the Corps declares the enclosed wetlands will be used as a flood storage area, the Service recommends that the Corps determine and designate the flood storage area within the levee system that the nonfederal sponsor will be responsible for maintaining.

USACE RESPONSE: Do not concur. The USACE is not declaring that the enclosed wetlands are flood storage and does not intend to purchase non-developmental easements for preservation of wetlands enclosed by the Recommended Plan. The action is not likely to induce development in the based flood plain due to the fact that a large portion of the base flood plain includes wetland areas. There would still be a significant economic cost to overcome for developing in these areas under both the FWOP and FWP conditions. These wetlands would be subject to existing Federal, State, and local laws and regulations regarding development of wetlands. This would include, but is not limited to; the Section 404 of the Clean Water, Coastal Zone Management Act, as well as local zoning ordinances. Addressing these laws and regulations would likely would still be a significant economic cost to overcome for developing in these areas under both the FWOP and FWP conditions.

6. Alternative C could potentially have impacts to the CWPPRA River Reintroduction into Maurepas Swamp (PO-29) project. The Service recommends close coordinate with the planning objectives and planning team of the restoration project and that any potential impacts to this CWPPRA project be addressed.

USACE RESPONSE: The River Reintroduction into Maurepas Swamp (PO-29) project is not authorized for construction. The State of Louisiana has applied for a permit to construct the project independently from the Federal CWPPRA project. The PO-29 project is not considered part of the future with or without conditions which would necessitate consideration of WSLP plan impacts on it as the State has yet to identify funding and has not received approval on the final permit(s). However, the team closely coordinated with the CWPPRA team since 2001. This coordination resulted in the consideration and modification of project features which would complement the former CWPPRA project if, and when it were to be constructed in the same manner as proposed under the CWPPRA study efforts . This includes modification of several alternative levee alignments to tie into the proposed Maurepas Swamp diversion guide levee. Should a river reintroduction project into Maurepas Swamp at the former CWPPRA site proceed to implementation, USACE will coordinate the this project's efforts with the planning elements of the entity implementing the river reintroduction project.

7. If it becomes necessary to use borrow sources other than the previously proposed environmentally cleared sites, the Service recommends investigating potential borrow sources based on the map identifying potential borrow areas that are likely to have minimal impacts to fish and wildlife resources that we provided, via a September 9, 2008, letter and based on our priority selection process for borrow material outlined in our August 7, 2006, letter to the Corps regarding the Greater New Orleans Hurricane and Storm Damage Risk Reduction project (Appendix A) should be utilized (please contact Cathy Breaux (504)862-2689 or David Walther (337)291-3122 for more information).

USACE RESPONSE: If necessary, USACE will consider USFWS recommended borrow sites and other available borrow sites likely to have minimal fish and wildlife impacts.

8. The enclosure of wetlands within the proposed levee is necessary to avoid pipeline and utility relocations and to provide for floodwater storage. Full, in-kind compensation (quantified as Average Annual Habitat Units) is recommended for unavoidable direct (levee footprint) adverse impacts and indirect habitat value losses (enclosed wetlands) on forested wetlands associated with levee construction. To help ensure that the proposed mitigation features meet their goals, the Service provides the following recommendations.

a. If applicable, a General Plan should be developed by the Corps, LDWF, and the Service in accordance with Section 3(b) of the Fish and Wildlife Coordination Act for mitigation lands.

USACE RESPONSE: A Mitigation Plan, consistent with the Fish and Wildlife Coordination Act, has been developed and will continue to be coordinated during the PED phase with the USFWS, LDWF and other resource agencies as well as the Non-Federal Sponsor. USACE is not declaring that the enclosed wetlands will be used for flood storage.

b. Continued mitigation planning should be closely coordinated with the Service, LDWF, and other interested natural resource agencies and should include any additional losses identified during future engineering and design studies.

USACE RESPONSE: Any additional losses identified during future engineering and design studies which require mitigation will be coordinated with the USFWS, other resource agencies and the Non-Federal Sponsor. See response to recommendation 7a above.

c. Mitigation measures should be constructed concurrently with the flood damage reduction features that they are mitigating (i.e., mitigation construction should be initiated no later than 18 months after levee construction has begun). Completion of mitigation means that interim success criteria have been achieved.

USACE RESPONSE: Consistent with 33 USCS §2283, the USACE intends to construct mitigation measures concurrent with the construction of risk reduction features. Construction of the mitigation features is anticipated to be initiated no later than 18 months after the construction of the risk reduction feature has begun. Mitigation success criteria have been identified in the mitigation plan Appendix A, Annex K.

d. If mitigation is not implemented concurrent with levee construction, the amount of mitigation needed should be reassessed and adjusted to offset temporal losses of wetlands.

USACE RESPONSE: If unforeseen circumstances result in mitigation not being implemented concurrent with construction of the flood damage reduction features, then USACE will adjust mitigation to offset wetland temporal losses. Such actions would be coordinated with the USFWS, other resource agencies and the Non-Federal Sponsor.

e. The Corps should remain responsible for the required mitigation until the mitigation is demonstrated to be fully compliant with interim success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and dike gapping criteria.

USACE RESPONSE: As soon as the initial construction of a mitigation feature, or of a functional portion of a mitigation feature, is completed by the USACE contractor, the District Commander will provide the non-Federal sponsor with a notice of construction completion (NCC) for that feature or for the functional portion of that feature. Thereafter, the non-Federal sponsor shall be responsible for the operation, maintenance, repair, rehabilitation and replacement (OMRR&R) of the NCC'd mitigation feature or functional portion thereof and all cost of the OMRR&R of the NCC'd features or functional portion will be borne by the non-Federal sponsor. More information is included in Appendix A, Annex K. Once USACE determines that the mitigation has achieved initial success criteria, monitoring will be performed by the Non-Federal Sponsor as part of its OMRR&R obligations. If, after meeting initial success criteria, the mitigation fails to meet its intermediate and/or long-term ecological success criteria, USACE will consult with other agencies and the Non-Federal Sponsor to determine whether operational changes would be sufficient to achieve ecological success criteria. If, instead, structural changes are deemed necessary to achieve ecological success, USACE will implement appropriate adaptive management measures following the contingency plan and subject to cost sharing requirements, availability of funding, and budgetary and other guidance.

f. The acreage restored and/or managed for mitigation purposes, and adjacent affected wetlands, should be monitored over the project life. This monitoring should be used to evaluate project impacts, the effectiveness of the compensatory mitigation measures, and the need for additional mitigation should those measures prove insufficient.

USACE RESPONSE: A full monitoring report with methodology has been developed and can be found in Section 7 of the mitigation plan (Appendix A, Annex K).

9. The Service recommends enough money be set aside for adaptive management to address potential impacts of the enclosed wetlands. The Service, LDWF, and other natural resource agencies should be consulted in the development of plans and specifications for all mitigation features and any monitoring and/or adaptive management plans. In addition, the Service recommends the Monitoring and Adaptive Management Plan, as it is further developed, be provided to the Service, NMFS, and LDWF for review, comment, and input.

USACE RESPONSE: Specific funds are not being set aside for the adaptive management of the enclosed wetlands. Any monitoring or adaptive management activities in the wetlands on the protected side of the levee would exceed the project purpose and would fall outside of the authorization. USACE will implement appropriate adaptive management measures following the contingency plan and subject to cost sharing requirements, availability of funding, and budgetary and other guidance. Funding requirements to address potential uncertainties to mitigation ecological success are included in the Adaptive Management and Monitoring Plan (Appendix A annex K. The USACE will continue to coordinate with the USFWS, other resource agencies and the Non-Federal Sponsor.

10. Alignment C will occur partly within the boundaries of Maurepas Swamp WMA. Please coordinate all activities within the WMA with LDWF. Please contact Mr. Christain Winslow (985-543-4781 or cwinslow@wlf.la.gov) and Mr. Mike Windham at 504-284-5268 or cwindham@wlf.la.gov for more information about appropriate WMA authorizations.

USACE RESPONSE: The USACE has and will continue to coordinate impacts of the Recommended Plan (Alternative C) with the LDWF.

11. Blind River is a Louisiana designated Natural and Scenic River. The Corps must obtain authorization from the LDWF, Scenic Rivers Program prior to initiating any of the proposed activities within or adjacent to the banks of Blind River. Scenic Rivers Coordinator Keith Cascio can be contacted at (318) 343-4045 or kcascio@wlf.la.gov.

USACE RESPONSE: The USACE will coordinate and, if necessary, obtain authorization from the LDWF, Scenic Rivers Program prior to initiating any proposed activities within or adjacent to the banks of the Blind River.

12. The Corps should coordinate closely with the Service, LDWF, and other fish and wildlife conservation agencies throughout the pre-construction engineering and design phase of project features including levees, floodgates, environmental water control structures, and operation plans to ensure that those features are designed, constructed and operated consistent with wetland restoration purposes and associated fish and wildlife resource needs, and to update and finalize impacts and to develop an adequate mitigation plan.

USACE RESPONSE: The USACE will continue to coordinate with the USFWS, other resource agencies and the Non-Federal Sponsor throughout the PED phase regarding project feature design, construction and operation with regard to updating and finalizing avoiding, minimizing, reducing and appropriately mitigating for unavoidable project-induced impacts to wetland, fish and wildlife and other significant resources which. Project-induced impacts to significant resources and the measures to mitigate such impacts will be documented in the mitigation plan, and the adaptive management and monitoring plans.

13. West Indian manatees (Trichechus manatus) occasionally enter Lakes Pontchartrain and Maurepas, and associated coastal waters and streams during the summer months (i.e., June through September). During in-water work in areas that potentially support manatees all personnel associated with the project should be instructed about the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Additionally, personnel should be instructed not to attempt to feed or otherwise interact with the animal, although passively taking pictures or video would be acceptable. For more detail on avoiding contact with manatee contact this office. Should a proposed action directly or indirectly affect the West Indian manatee, further consultation with this office will be necessary.

USACE RESPONSE: Concur. All personnel associated with project in-water work areas will be instructed about the potential presence of manatees; to obey speed zones; and to avoid collisions with manatees; and be advised that there are civil and criminal penalties for harming, harassing, or killing manatees. Personnel will also be instructed not to attempt to feed or otherwise interact with the manatee. The USACE will consult with the USFWS should a proposed action potentially directly or indirectly affect the West Indian manatee.

14. Avoid adverse impacts to nesting bald eagles and wading bird colonies through careful design project features and timing of construction. The Service and LDWF recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies and bald eagles during the nesting season (i.e., September 1 through February 15 for wading bird nesting colonies and October through mid-May for bald eagles).

USACE RESPONSE: Concur. Project design and construction timing will be further developed, refined and scrutinized to insure there would be no adverse project-induced impacts to bald eagles and wading bird colonies. A qualified biologist will inspect work sites for the presence of undocumented nesting colonies and bald eagles during the nesting season (i.e., September 1 through February 15 for wading bird nesting colonies and October through mid-May for bald eagles).

15. If proposed project features, including adaptive management features, are changed significantly or are not implemented within one year of the Endangered Species Act consultation letter, we recommend that the Corps reinitiate coordination with the Service and NMFS to ensure that the proposed project would not adversely affect any federally listed threatened or endangered species or their critical habitat.

USACE RESPONSE: To ensure that the proposed project would not adversely affect any federally listed threatened or endangered species or their critical habitats, the USACE will reinitiate endangered species coordination with the USFWS and NMFS if proposed project features, including

adaptive management features, are changed significantly or are not implemented within one year of the Endangered Species Act consultation letter.

16. Costs and tasks associated with the Service's involvement in future planning and construction phases should be coordinated with the Service prior to the finalization of the project management plan or similar documents (e.g., decision management plan).

USACE RESPONSE: The USACE will coordinate the costs and tasks associated with the USFWS involvement in future planning and construction phases prior to the finalization of the project management plan or similar documents.

6.11 Magnuson-Stevens Fishery Conservation and Management Act of 1976 and Magnuson-Stevens Act Reauthorization of 2006 (Essential Fish Habitat)

These laws govern marine fisheries management in the U.S. Essential Fish Habitat (EFH) does not intersect the proposed alignment or the enclosed area in the near term. The USACE has determined that the Recommended Plan would have no impacts to EFH.

6.12 Marine Mammal Protection Act of 1972 (Marine Mammals)

The act protects whales, dolphins, sea lions, seals, manatees and other species of marine mammals. The USACE finds the Recommended Plan would have no effect on marine mammals that may occasionally be found in the area. To avoid "takings" of the West Indian manatee and ensure compliance with the law, USACE commits that 1) all construction staff will be educated about the laws and manatees, 2) a search for manatees in work areas would be conducted before construction, and 3) appropriate best management practices to avoid or minimize potential entrapment of manatees during construction would be implemented.

6.13 Migratory Bird Treaty Act of 1918 & Migratory Bird Conservation Act of 1929 (Migratory Birds)

The laws protect migratory birds and their habitat. Many important habitats in the area provide migratory bird shelter, nesting, feeding and roosting habitat. The BMPs listed in Appendix A and USFWS recommendations would be followed to avoid impacts to any protected birds. Implementation of the Recommended Plan will require compensatory mitigation for unavoidable project-induced habitat impacts.

6.14 National Historic Preservation Act of 1966 (Cultural and Historic Resources)

In compliance with Section 106 of the act and 36 CFR Part 800, Federal agencies must take into account the effects of their actions on historic properties and afford the Advisory Council on Historic Properties (ACHP) a reasonable opportunity to comment on such undertakings. Historic properties include any prehistoric or historic district, site, building, structure, or object that is included in, or eligible for inclusion in, the National Register of Historic Places. A Federal agency shall consult with any Indian tribe that attaches religious and cultural significance to such properties. Agencies shall afford the State Historic Preservation Officer (SHPO) and Indian tribes a reasonable opportunity to comment before decisions are made. Section 106 consultation was initiated with the SHPO and Indian tribes on May 3, 2013. USACE has determined that the effects on historic properties cannot be fully determined before plan approval, and in accord with ER 1105-2-100, paragraph C-4(d)(5)(d)(2), USACE has elected to fulfill its obligations under Section 106 of the National Historic Preservation Act of 1966, as amended, through the execution and implementation of a Programmatic Agreement. A copy of the executed Programmatic Agreement for consultation, identification of historic properties, assessment and resolution of adverse effects is included in Appendix A, Annex F.

6.14.1 Tribal Consultation (Tribal Interests)

In partial fulfillment of EO 13175 ("Consultation and Coordination With Indian Tribal Governments"), NEPA, Section 106 of the National Historic Preservation Act and 36 CFR Part 800, consultation was initiated with these Federally-recognized Tribes: Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Quapaw Tribe of Oklahoma, Seminole Nation of Oklahoma, Seminole Tribe of Florida and Tunica-Biloxi Tribe of Louisiana. In a May 3, 2013,

letter, USACE summarized the study authority and history, study area and proposed alignment, offering tribes an opportunity to review and comment on the potential to significantly affect protected tribal resources and rights, or Indian lands. The Quapaw Tribe of Oklahoma determined that the undertaking is not within their area of interest and does not wish to comment. Appendix A, Annex F has a copy of the executed Programmatic Agreement for consultation, identification of historic properties, assessment and resolution of adverse effects.

6.15 Resource Conservation and Recovery Act of 1976, as amended by the Hazardous and Solid Waste Amendments of 1984

A Phase I Environmental Site Assessment (ESA) is required for all of the USACE Civil Works Projects, to facilitate early identification and appropriate consideration of potential Hazardous, Toxic, and Radioactive Waste (HTRW) problems. HTRW includes any material listed as a "Hazardous Substance" under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Other regulated contaminants include those substances that are not included under CERCLA but pose a potential health or safety hazard, and are regulated. Examples include, but are not limited to, many industrial wastes, naturally occurring radioactive materials (NORM), many products and wastes associated with the oil and gas industry, herbicides, and pesticides. Engineer Regulation ER 1165-2-132 and Division Regulation DIVR 1165-2-9 established policies for conducting HTRW review for USACE Civil Works Projects.

An ASTM E 1527-05 Phase 1 Environmental Site Assessment (ESA), HTRW 14-02 dated February 28, 2014, is included in Appendix A. The objective of the Phase I Environmental Site Assessment (ESA) is to identify, to the extent feasible pursuant to the process described herein, recognized environmental conditions(REC) in connection with a given property. This assessment revealed several potential RECs (pipelines and oil and gas wells) in connection with the project's structural and localized storm surge risk reduction sites as well as within five of the seven mitigation areas.

Numerous oil and gas pipelines, oil and gas well-heads (active, inactive, and plugged and abandoned), and oil and gas related facilities were found to be located within or near the footprint of the structural and localized storm surge risk reduction project areas.

No field inspections were conducted at the Blind River, Bonnet Carré Spillway, and the Maurepas Crawfish Ponds locations. A data base search, however, was conducted for the mitigation areas. Several potential RECs (pipelines and oil and gas wells) were identified within five of the six mitigation areas.

Care must be taken to avoid impacts to pipelines or oil and gas wells during construction of all features.

6.16 Wild and Scenic River Act of 1968 (Rivers)

The Wild and Scenic Rivers Act establishes a National Wild and Scenic Rivers System. The Louisiana Scenic Rivers Act recognizes and implements the 1968 Federal law, to preserve, protect and enhance the wilderness qualities, scenic beauties and ecological regimes of rivers and streams. Any construction within 100 feet of a scenic stream requires a scenic streams permit. The Recommended Plan would not impact the Blind River, the only scenic river within the study area.

6.17 Executive Order 11514, Protection and Enhancement of Environmental Quality

EO 11514 directs Federal agencies to "initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals." The Recommended Plan complies with EO 11514.

6.18 Executive Order 11988, Floodplain Management

The order requires a Federal agency, when taking an action, to avoid short- and long-term adverse effects associated with the occupancy and the modification of a floodplain. The agency must avoid direct and indirect support of floodplain development whenever floodplain siting is involved. In addition, the agency must minimize potential harm to or in the floodplain and explain why the action is proposed. Additional floodplain management guidelines for EO 11988 were provided in 1978 by the Water Resources Council.

The wise use of floodplains concept, as described in EO 11988, was incorporated as a life safety consideration in this study. This approach was based on SMART planning study objectives of applying qualitative rather than quantitative analysis; use of existing data/inventory; and professional judgment. In calculating the potentially developable land for the study area, the following areas were excluded:

- Areas that are currently developed were excluded
- Areas that are owned in fee by governments or nonprofit organizations and that are protected for open space purposes were excluded (WMA, Reserve Airport).
- Large industrial sites. Future residential development is not likely to occur because of the proximity.
- Areas with flood depths greater than 3 feet for the FEMA 1% (1/100) ACE base flood event because constructing buildings to meet FEMA floodplain management requirements is assumed to be cost prohibitive. A general assumption of a 6 ft NAVD 88 elevation was used to determine areas with flood depths greater than 3 feet. This is consistent with planning codes where construction has to be above the 6 ft NAVD 88 or above the FEMA 1% (1/100) ACE base flood event depending which one is greater.

Using the criteria and assumptions listed above for determining potentially developable floodplain, maps were prepared and acres calculated for the No Action and the Recommended Plan (Figure 6-1). These maps do not forecast future growth. The areas in green and blue would have limited development due to economic cost factors. There would still be a significant economic cost to overcome for developing in these areas under both the FWOP and FWP conditions. These areas are mainly wetlands and would still flood from rainfall events. As stated in Chapter 5, the levee system would only be closed for storm surge events. Existing local building codes would still required developments to build above the 100 yr stage for rainfall impacts, and with an open levee system, the stage is still going to increase over time because of RSLR impacts. Existing local building codes would require significant amounts of fill material for new developments. These areas would still be in jurisdictional wetland and would required compensatory mitigation for impacting these areas. These two factors and the existing available upland areas for development; at a much lower cost, would limit the development in these areas.

The NED Plan would result in an additional 4,300 acres of potentially developable floodplain over the period of evaluation in St. Charles and St. John the Baptist Parishes, but these same 4,300 acres would be developable under the no action plan, due to the fact that FEMA Floodplain management guidelines do not take into consideration RSLR. These areas would be considered high ground. The federal action would only change the more recent base flood advisory maps (post Katrina) and future flood advisory maps which are based on storm surge impacts. FEMA Floodplain management guidelines would still require updates to the base flood elevations based on changing rainfall impacts and day-to-day tidal impacts from changes in RSLR.

The eight-step EO 11988–Floodplain Management evaluation process is outlined below with discussion of the Recommended Plan formulation process to demonstrate coordination and compliance with the EO.

Step 1: Determine if a proposed action is in the base floodplain (1/100 year floodplain or 1% ACE).
The Recommended Plan is within the defined base floodplain. The plan proposes to improve the level of risk reduction in the West Shore study area through a system of levees, floodwalls, and localized storm surge risk reduction measures which would reduce flood risk from tropical storm surge and address residual risk to public and life safety from tropical storm surge events.

Step 2: If the action is in the floodplain, identify and evaluate practicable alternatives to the location.
The study evaluated all practicable alternatives by following the six-step planning process and evaluating a wide range of measures and plans using available information, engineering analysis, professional judgment, and risk-informed decision-making. See Chapter 3 and Appendix F for details concerning plan formulation. Practicable alternatives considered included:

- A number of plans generally following a demarcation between wetlands and development. These were screened due to costs of pump stations and pipeline relocations or factors of completeness.
- Manchac Pass storm-surge barrier. This was screened due to surge flanking and environmental impacts.
- A storm-surge barrier at the Rigolets. This would not reduce flood risks in the study area.
- Elevate all structures within the floodplain. This was screened out due to high costs.
- Removal of existing development. This was not considered a practicable alternative.

Step 3: If the action must be in the flood plain, advise the general public in the affected area and obtain their views and comments.
The public has been advised through the integrated NEPA process and proposed outreach program. The NEPA process requires and provides for public disclosure through various means, such as scoping meetings, public notices, websites, direct mailing, and presentations to various agencies and small groups.

Throughout the study process, the team gave presentations to various agencies and various small stakeholder groups to obtain their individual views and comments. In addition, three NEPA public meetings were held in the affected area to obtain the public's view and comments. These meetings included:

- November 2, 2013 in Gonzales, LA (Ascension Parish) – Public Hearing.
- September 17, 2013 in Laplace, LA (St. John Parish) – Public Hearing.
- September 10, 2013 in Lutcher, LA (St. James Parish) – Public Hearing.

Step 4: Identify beneficial and adverse impacts due to the action and any expected losses of natural and beneficial flood plain values. Where actions proposed to be located outside the base flood plain will affect the base flood plain, impacts resulting from these actions should also be identified.
Project construction would cause loss of swamp and some bottomland hardwoods but would not significantly diminish existing floodplain natural values. To compensate for these losses, the study recommends mitigation measures to offset the impacts from both the direct and indirect impacts from the levee and localized storm surge risk reduction measures. Appendix A provides more information on the mitigation plan. Additionally, the structural alignment in the Recommended Plan will have both a flood side and protected side ditch to aid in the hydraulic connectivity of the wetlands.

Beneficial impacts of the proposed Recommended Plan are listed below.

- The probability of flooding of existing infrastructure and agricultural land as a result of tropical storm surge will be reduced.
- Annualized economic losses to existing infrastructure and agricultural land will be reduced.
- Annualized flood recovery cleanup and disposal tonnage will be reduced.
- Risk to public and life safety due to flooding from tropical storm surge will be reduced.

Adverse impacts of the proposed Recommended Plan are listed here.

- Short-term and long-term direct and indirect environmental impacts will occur with the construction of the action. Wetland Value Assessment (WVA) models were run on the project levee footprint to determine the functions and values of the impacted habitats. These results are expressed in Average Annual Habitat Units. The models predict that approximately 1,189 AAHUs would be lost due to direct and indirect habitat impacts over the 50-year period of analysis. A mitigation plan to compensate for project-related direct and indirect impacts to swamp and Bottomland-Hardwood-Wet (BLH) has been developed for the project. Six mitigation plan components will provide the required compensation for habitat impacts (See Environmental Appendix, Mitigation Planning).

Step 5: If the action is likely to induce development in the base flood plain, determine if a practicable non-flood plain alternative for the development exists.
The plan cost-effectively minimizes threats to life and property and natural and beneficial floodplain values. The action is not likely to induce development in the based flood plain due to the fact that a large portion of

the base flood plain includes wetland areas. There would still be a significant economic cost to overcome for developing in these areas under both the FWOP and FWP conditions. These wetlands would be subject to existing Federal, State, and local laws and regulations regarding development of wetlands, and would limit development in these areas. This would include, but is not limited to; the Section 404 of the Clean Water, Coastal Zone Management Act, as well as local zoning ordinances. Addressing these laws and regulations would likely would still be a significant economic cost to overcome for developing in these areas under both the FWOP and FWP conditions.

Step 6: As part of the planning process under the Principles and Guidelines, determine viable methods to minimize any adverse impacts of the action including any likely induced development for which there is no practicable alternative and methods to restore and preserve the natural and beneficial flood plain values. This should include reevaluation of the "no action" alternative.
Under the Principles and Guidelines, the Recommended Plan was evaluated and it was determined that the recommendation would minimize any adverse impacts by maintaining the existing hydrologic connectivity. Hydrologic connectivity would be maintained to the extent practicable through water control structures except during closure for hurricanes or tropical storms. When the system is closed, pumps would operate on average for 1.7 storms per year, which equates to a closure of structures on average 8.5 days per year. This expected rate of closure would be the same regardless of the actual rate of RSLR as closure of the system is tied to tropical storm events and the elevation trigger would be adjusted as sea level rises. The risk reduction system is only authorized to address storm surge caused by hurricane and tropical storm events. It is not authorized to mitigate for or reduce impacts caused by higher day-to-day water levels brought about by increases in sea level rise.

The loss of natural and beneficial flood plain values would also be minimized through the existing parish floodplain management plan and zoning rules that already prevent development these areas. As stated above, the pumps would only operate on average for 1.7 storms per year. The NFS has an obligation relating to the operation of the project, specifically pump station capacities, to prevent encroachments that would impact the utility of the project when the pump station is operating. The NFS will be required to comply with flood plain management requirements and ensure that project features such as pump stations would not be impacted by developments in the areas behind the risk reduction system. The pump system is designed to match the existing gravity drainage capacity when the system is closed. The NFS would have a responsibility to ensure that this operation of the project features is maintained.

Step 7: If the final determination is made that no practicable alternative exists to locating the action in the flood plain, advise the general public in the affected area of the findings.
Alternative C was the practicable alternative for addressing flood risk in the area. The team review Alternative A as an alternative plan to C, but determined that when factoring in lessons learned from past hurricane risk reduction systems, the USACE could not select Alternative A as practicable alternative because it would be counter to these two critical risk assessment areas discussed in the IPET report (i.e., system complexity and residual risk).
.
A NEPA record of decision will be publically issued after approval of the Final Integrated Feasibility Report and EIS.

Step 8: Recommend the plan most responsive to the planning objectives established by the study and consistent with the requirements of the Executive Order.
Alternative C is the plan that maximizes NED benefits while being consistent with the requirements of the Executive Order. The Recommended Plan would avoid short-term and long-term adverse effects associated with the occupancy and the modification of the existing floodplain. Due to the fact that the recommendation only addresses the existing and future risk of damages from hurricane and tropical storm surge events, there would be minimum changes in the floodplain development when compared to the no action condition. Low-lying communities would still see significant residual risk from flooding associated with significant rainfall

events. In addition, as discussed in step 6, the existing floodplain would still be vulnerable to changing rates of RSLR, further limiting the development of the existing floodplain. Communities on their own, in the future, can further manage their own residual risk. Any recommendation with structures always has some level of risk of failures or overtopping. Local communities can always reduce their risk by limiting development in areas low-lying areas and in vulnerable areas of the floodplain.

6.19 Executive Order 11990, Protection of Wetlands

The EO directs Federal agencies to avoid to the extent possible, long and short term adverse impacts associated with the destruction or modification of wetlands, and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. Mitigation planning was integrated into the study by considering, individually and collectively, each of the NEPA mitigation actions to avoid, minimize, reduce and rectify potential adverse wetland impacts to the extent practicable. Implementing the Recommended Plan requires compensatory mitigation for unavoidable impacts that will require replacing or providing substitute resources. Appendix A includes a mitigation plan. Unavoidable project-induced impacts will be mitigated in-kind, and hence, the plan complies with the EO 11990.

6.20 Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

The EO requires agencies to make achieving environmental justice (EJ) part of their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of programs, policies and activities on minority and low-income populations. Potential EJ issues have been considered in planning. Additionally, homes in Convent were canvassed and given public meeting notices during a two week period from April 30 through May 10th 2013. The concept of EJ was briefly explained to the residents available, who were then asked if there were any concerns about the proposed work in the area, none were forthcoming with any specific EJ issues. Aside from the NEPA mandated meetings a specific EJ meeting was held on May 21, 2013 in Lutcher, Louisiana. The meeting was centrally located and reasonably distanced (less than 10 miles) so that residents could attend if interested and because there were no large buildings available in Convent that could accommodate a large crowd. Contact information was also made available online to help assist in the identification of potential EJ issues. To date, no residents have contacted the EJ coordinator with specific EJ concerns. These public involvement efforts have provided a reasonable opportunity for residents to comment and/or attend meetings if interested per EO 12898 The USACE has concluded that implementation of Alternative C would not have a disproportionate adverse impact to minority and/or low-income residents as it would provide additional benefits to safety, life, health and properties of all residents and businesses within the study area regardless of race or income level by reducing the overall level of flood risk by the end of the period of analysis.

6.21 Executive Order 13112, Invasive Species

EO 13112 requires agencies to prevent the introduction of invasive species; provide for their control; and minimize their economic, ecological and human health impacts. The Recommended Plan is consistent with the EO to the extent practicable and permitted by law and subject to the availability of appropriations, and within Administration budgetary limits. Relevant programs and authorities to prevent invasive species introductions would be used during construction. The USACE will not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species unless it has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm; and that all feasible and prudent measures to minimize risk of harm would be taken in conjunction with the actions.

6.22 Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

EO 13186 requires agencies to take actions to further implement the Migratory Bird Treaty Act. The Recommended Plan has been evaluated for effects on migratory birds, with emphasis on species of concern. Habitats in the project area provide migratory bird shelter, nesting, feeding and roosting habitat. The Recommended Plan would potentially convert 1,112 acres of swamp habitat and 124 acres of BLH habitat to levee. The plan would enclose and potentially change hydrologic conditions of up to 8,521 acres of swamp

and BLH habitats. Implementation of the plan will require compensatory mitigation for unavoidable project-induced impacts to bird and wildlife habitat.

6.23 Land and Water Conservation Act of 1965

The Act established a fund from which Congress can make appropriations for outdoor recreation. The USACE must coordinate with the Secretary of the Interior to insure that no property acquired or developed with assistance from this Act will be converted to other purposes other than outdoor recreation uses. The USACE in coordination with CPRAB, LADWF and USFWS determined that lands acquired as part of the WSLP project would not impact property acquired or developed with assistance from the Act.

7.0 PUBLIC INVOLVEMENT (*NEPA REQUIRED)

Public involvement is an important part of planning and decision-making. Agencies, non-governmental organizations, and citizens provided valuable input for the final recommendation.

7.1 Public Meetings and Other Coordination Efforts

Public meetings in three parishes were held during the study. These meetings included:

NEPA Public Hearings

- November 2, 2013 in Gonzales, LA (Ascension Parish) – Public Hearing.
- September 17, 2013 in Laplace, LA (St. John Parish) – Public Hearing.
- September 10, 2013 in Lutcher, LA (St. James Parish) – Public Hearing.
- Approximately 700 people attended the three public hearings.
- A total of 66 attendees provided 185 individual comments.

Project Updates

- June 6, 2013 - Project update to the CPRAB, FEMA, Louisiana Department of Transportation and Development (LDOTD), Federal Highway Administration (FHWA), and other government agencies
- May 6, 2013 - Project update to CPRAB, FEMA, LDOTD, FHWA, and other agencies
- April 30, 2012 - Project update in St. John the Baptist Parish
- March 19, 2013 - Update to CPRAB, FEMA, LDOTD, FHWA, and other agencies
- February 22, 2013 - Update to CPRAB, FEMA, LDOTD, FHWA, and other agencies
- January 31, 2013 - Update to CPRAB, FEMA, LDOTD, FHWA, and other agencies
- November 15, 2012 - Project update in St. John the Baptist Parish
- February 16, 2011 - Project update to the St. John's Riverlands Civic Association

Environmental Justice Outreach

- April 30, 2013 - Door to door visits with residents in community
- May 8, 2013 - Door to door visits with residents in community
- May 10, 2013 - Door to door visits with residents in community

Environmental Justice Community Meeting

- May 21, 2013 - Environmental justice community meeting in St. James Parish

NEPA Public Scoping Meeting

- January 21, 2009 - Public scoping meeting in St. John the Baptist Parish

Meeting participants were generally most interested in potential levee alignments and impacts to their communities. Other comments focused on the construction schedule, potential impacts to wetlands, the value of hurricane evacuation routes, and funding.

7.2 Draft Report Recipients

A Notice of Availability for the Integrated Draft Feasibility Report and Environmental Impact Statement was published in the Federal Register on August 23, 2013, initiating the 45 day public review period. Due to the Federal government shutdown, the comment period was extended for an additional two weeks from Tuesday, October 8, 2013 to Tuesday, October 22, 2013. This report was distributed to Federal, state, and local agencies; businesses, libraries, and universities; and others. The following stakeholders received a copy of the draft report (Table 7-1). This list has also been used for the final report submittal to the public and agencies.

Table 7-1: List of report recipients.

Louisiana Congressional	Louisiana State Senators &	Levee Districts & Floodplain
Senator Mary Landrieu	Jody Amedee, State Senator	Amite River Basin Commission
Senator David Vitter	Randal L. Gaines, State Representative	Lafourche Basin Levee District
Congressman Rodney Alexander	Gregory A. Miller, State Representative	Pontchartrain Levee District
Congressman Charles W. Boustany, Jr.	Ed Price, State Representative	
Congressman William Cassidy	Gary L. Smith, Jr., State Senator	
Congressman John Fleming	Tom Willmott, State Representative	
Congressman Cedric Richmond		
Congressman Steve Scalise		
St. Charles Parish Government	**St. James Parish Government**	**St. John the Baptist Government**
V.J. St. Pierre, Jr., Parish President	Timothy P. "Timmy" Roussel	Natalie Robottom, Parish President
Parish Council	District Conservationist	
Permit Officer	Director of Operations	
	Parish Police Jury	
Town of Gramercy Government	**Town of Lutcher Government**	**Town of Vacherie Government**
Mayor	Clerk	Town Council
Aldermen	Aldermen	
Permit Official		
Federal Agencies		
Advisory Council on Historic Preservation	**Department of Transportation:** Division Administrator, Federal Highway Administration; Southwest Region, Federal Aviation Administration	**Department of Energy:** Office of Environmental Compliance
Department of Homeland Security: *Federal Emergency Management Agency:* Gary Zimmerer, Region VI	**Department of Agriculture:** Carl J. Breville. *Natural Resources Conservation Service:* Kevin Norton, State Conservationist; Michael Trusclair, District Conservationist	**Environmental Protection Agency:** Office of Federal Activities, EIS Filing Section: Region VI, Marine and Wetlands Section; Rhonda Smith, Region VI - Office of Planning and Coordination
Department of the Army: Rayford E. Wilbanks, MVD	**Department of the Interior:** *Office of Environmental Policy and Compliance. U.S. Fish and Wildlife Service:* Lacombe Office; Lafayette Field Office, Jeff Weller, Field Supervisor	**Department of Commerce:** *National Oceanic and Atmospheric Administration:* David Bernhart, Protected Species Division; Richard Hartman, Habitat Conservation Division; NEPA Coordinator, Office of Program, Planning & Integration
State of Louisiana (LA) Agencies and Offices		
Honorable Bobby Jindal	**LA Department of Agriculture & Forestry:** Office of Forestry; Mike Strain; Matthew Keppinger, Office of Agriculture & Environmental Science	**LA Department of Public Works**
Lieutenant Governor Jay Dardenne	**LA Department of Environmental Quality:** Environmental Planning Division ; Office of the Secretary; Scott Guilliams	**LA Department of Transportation & Development**
Secretary of State	**LA Department of Health & Hospitals:** Office of Public Health, Center for Environmental Health	**LA Department of Wildlife and Fisheries:** Secretary; Maurice B. Watson; Tim Morrison; Gary Lester, Natural Heritage Program

Attorney General's Office	**LA Department of Natural Resources:** Keith Lovell, Interagency Affairs; Charlie Mestayer, Lafayette Field Office; Division of State Lands; Office of Conservation, Surface Mining Division; Consistency Coordinator, Coastal Resources Program	**Louisiana Division of Administration:** State Land Office; State Planning Office
Governor's Office for Coastal Activities	**Coastal Protection and Restoration Authority Board:** Garret Graves	**LA Office of Cultural Development:** Pam Breaux, State Historic Preservation Officer; Division of Outdoor Recreation
Coastal Protection and Restoration Authority: Stephanie Zumo		**LA State Board of Commerce & Industry**
Native American Tribes		
Adai Caddo Indians of Louisiana	Clifton Choctaw Tribe of Louisiana	Point au Chien Tribe
Alabama Coushatta Tribe of Texas	Coushatta Tribe of Louisiana	Quapaw Tribe of Oklahoma
Biloxi Chitimacha	Four-Winds Cherokee Tribe	Seminole Tribe of Florida
Caddo Nation	Grand Caillou/Dulac Band	Seminole Nation of Oklahoma
Chitimacha Tribe of Louisiana	Isle de Jean Charles Band	Tunica-Biloxi Tribe of Louisiana
Choctaw-Apache Tribe of Ebarb	Jena Band of Choctaw Indians	United Houma Nation
Choctaw Nation of Oklahoma	Louisiana Choctaw Tribe	
Media Outlets	**Businesses & Individuals**	**Libraries & Universities**
St Charles Herald Guide	Entergy	St. John The Baptist Parish Library
L'Observateur	Wally Landry, Crucial, Inc.	St. James Parish Library
News Examiner	Donald Landry, South Louisiana Environmental Council	**Louisiana State University:** Craig A. Johnson, Louisiana Geographic Information Center; Charles Wilson, Office of Sea Grant Development; Dept. of Geography

7.3 Views of the Public

Comments

Verbal comments received at each of the Public Hearings were made part of the Public Hearing transcript and were included within the comment spreadsheet.

Verbal comments fell into these main points:

- Support for selecting Alignment D.
- Need to include all of the benefits associated with selecting Alignment D.
- Alignment C will push water into St. James Parish.
- Why not select D if it is only $10 million more to construct compared to C?
- The report says most of the forested wetlands will be lost in the next 50 years due to sea level rise and saltwater intrusion - why not build D to protect the wetlands?
- Consider backwater flooding.
- Our house may be protected with a localized storm surge risk reduction plan, but our property will still flood, and we will not be able to get in and out of the area for days.

During the comment period, approximately 200 individuals provided 402 comments (via verbal at meetings, letter, email, and comment cards). A majority of the correspondence had the following themes:

- "I am requesting your assistance to promote the option Alignment D. Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.

- "Building a levee in St. John Parish and not protecting St. James Parish will put water/funnel water in St. James Parish"

- "We need the highways to be protected so that the emergency vehicles can get to the people who need assistance. The only way to protect our highways is Alternative "D".

Written comments were received from a number of Congressional offices, Federal and State agencies, NGOs, towns, and citizens of affected parishes. Letters were provided from the following:

- Senator David Vitter (LA)
- Monica Salins, Executive Director of the Pontchartrain Levee Board (NFS)
- State of LA – CPRAB (NFS)
- Timothy Roussel – Parish President of St. James
- John Berthelot - State Representative of Louisiana (District 88)
- Gregory Miller – State Representative of Louisiana (District 56)
- Stat of LA - Department of Transportation and Development
- State of LA – State Parks
- State of LA – Department of Wildlife and Fisheries
- Town of Lutcher
- Town of Gramercy
- US Fish and Wildlife Service
- National Marine Fisheries Service
- US Environmental Protection Agency
- Environmental Defense Fund
- Lake Pontchartrain Basin Foundation

Within Appendix A is the comment and response spreadsheet listing each commenter, their affiliation; comment and USACEs response; copies of the comment letter identified by a unique identifier and the public hearing transcript from each public hearing.

Independent External Peer Review

An Independent External Peer Review (IEPR) was conducted on the Draft Report during the public comment period. The IEPR comments and USACEs responses are available at the following location: http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.aspx

8.0 RECOMMENDATIONS

Information in this document was developed for feasibility analysis, with input from agencies and comments from the public, to help refine potential solutions to reduce storm surge flood damages to St. Charles, St. John the Baptist and St. James Parishes, Louisiana. These sources of information will assist the USACE Commander in making an informed decision.

8.1 Recommended Plan

The Recommended Plan is Alternative C, which is the plan that maximizes NED benefits while protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Alternative C begins at the west guide levee of the Bonnet Carré Spillway and extends to Hope Canal. The recommended plan also includes a localized storm surge risk reduction system in the communities of Gramercy, Lutcher and Grand Point, which are located outside of the proposed levee system (Figure 5-2). The purpose of this localized storm surge risk reduction system is to maximize the net benefits in the entire study area and to adequately address the limited potential for induced damages, as described in Chapter 3.9.4. The levee system is based on a 1% probability storm level of risk reduction and a 2020 intermediate RSLR condition. Future levee lifts will be maintained in order to maintain the 1% probability storm level of risk reduction levee system so long as the project remains authorized. The localized storm surge risk reduction system focused on providing risk reduction above the 1% AEP storm stages in 2020.

8.1.1 Levee System

As described in Chapter 5.1, the levee system is approximately 18.27 miles long and includes 4 pump stations and 2 drainage structures along the alignment. All borrow material would come from the canals and ditches associated with the levee features and the Bonnet Carré Spillway. The pump stations would only operate during hurricane and tropical storm surge events and the drainage structures would be open outside of these events. Rainfall and high tides would still cause significant flooding of the swamps within the levee-enclosed area. As stated above the system would only prevent flooding of these areas under storm events.

8.1.2 Localized Storm Surge Risk Reduction System

As described in Chapter 5.1, the main localized storm surge risk reduction measures include berms and flap gates on existing drainage features and roadways. Additional flood proofing measures such as the raising of residential structures, non-residential structure flood proofing, and small individual berms around non-residential structures, are limited to a few structures located outside of the two major berms in Gramercy/Lutcher and Grand Point in St. James Parish. Property owner participation in the additional flood proofing measures will be voluntary. A flood proofing agreement will be executed between the property owner and the NFS for the elevation of residential structures. A flood proofing agreement will also be executed between the property owner and the NFS for the non-residential structures. It is expected that occupants will need to temporarily relocate from the individual residences that are being elevated as a part of the localized storm surge risk reduction component. No relocation is necessary for flood proofing individual non-residential structures. Because participation in the elevation of dwellings is voluntary, owner-occupants are not eligible for relocation assistance as indicated in 49 CFR Part 24.

8.1.3 Mitigation requirements

Mitigation for fish and wildlife habitat impacts is included as a project feature.

8.2 Plan Implementation

The following sections describe the NFS financing and the division of plan responsibilities.

8.2.1 Federal and Non-Federal Cost-Sharing

The State of Louisiana acting through the CPRAB will be the NFS for design, construction, operation, maintenance, repair, rehabilitation and replacement. The cost share for the design and construction of the project will be 65 percent Federal and 35 percent non-Federal. Among other responsibilities, the CPRAB

must provide all project LERRDs required for the project and submit any work-in-kind (WIK) request for approval by the Federal government for the pre-construction engineering, and design (PED) of the project. WIK associated with the construction for both the structural and localized storm surge risk reduction system components of the project will be negotiated with the NFS, contingent upon approval at the Assistant Secretary of the Army for Civil Works (ASACW) (or appropriate designee) in accordance with applicable guidance and regulations. The OMRR&R cost of the project is estimated to cost on an average annual basis $5,070,000 and is a 100 percent NFS responsibility. The estimated total project cost for the recommended plan is $718,091,000 at a FY 2015 price level.

8.2.2 Federal Responsibilities

The Federal government will be responsible for PED and construction of the project in accordance with the applicable provisions of Public Law 99-662 (WRDA of 1986), as amended. The Government, subject to Congressional authorization, the availability of funds, and the execution of a binding agreement with the NFS in accordance with Section 221 of the Flood Control Act of 1970, as amended, and using those funds provided by the NFS, shall expeditiously construct the project, applying those procedures usually applied to Federal projects, pursuant to Federal laws, regulations, and policies.

8.2.3 Non-Federal Responsibilities

Federal implementation of the project would be subject to the NFS agreeing in a binding written agreement to comply with applicable Federal laws and policies, and to perform the following non-Federal obligations, including, but not limited, to the following:

a) Provide 35 percent of total project costs as further specified below:

1. Provide the required non-Federal share of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

2. Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs;

3. Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material, all as determined by the Government to be required or to be necessary for the construction, operation, maintenance, repair, rehabilitation and replacement of the project;

4. Provide, during construction, any additional funds necessary to make its total contribution equal to 35 percent of total project costs;

b) Shall not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the non-Federal obligations for the project unless the Federal agency providing the funds verifies in writing that such funds are authorized to be used to carry out the project;

c) Not less than once each year, inform affected interests of the extent of protection afforded by the project;

d) Agree to participate in and comply with applicable Federal floodplain management and flood insurance programs;

e) Comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), which requires a non-Federal interest to prepare a floodplain management plan within one

year after the date of signing a project partnership agreement, and to implement such plan not later than one year after completion of construction of the project;

f) Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with protection levels provided by the project;

g) Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the level of protection the project affords, hinder operation and maintenance of the project, or interfere with the project's proper function;

h) Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601- 4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

i) For so long as the project remains authorized, OMRR&R the project or functional portions of the project, including any mitigation features, at no cost to the Federal government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal government; provided, however, that the NFS shall have no obligation to address loss of risk reduction due to relative sea level rise through the repair, rehabilitation or replacement of localized storm surge risk reduction components associated with the construction of large ring berms around groups of residential structures, nor shall the NFS be obligated to OMRR&R those flood proofing measures that constitute elevation of individual residential structures or construction of small ring berms around individual non-residential or light industry/warehouse structures.

j) Give the Federal government a right to enter, at reasonable times and in a reasonable manner, upon property that the NFS owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project;

k) Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;

l) Keep and maintain books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 CFR Section 33.20;

m) Comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701 – 3708 (revising, codifying and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 et seq.), and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c et seq.);

n) Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the CERCLA, Public Law 96-510, as amended (42 U.S.C. 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal government determines to be required for construction, operation, and maintenance of the project, including those lands, structures and interests necessary for the implementation of all of the localized storm surge risk reduction components of the Project as described in this Report. However, for lands that the Federal government determines to be subject to the navigation servitude, only the Federal government shall perform such investigations unless the Federal government provides the NFS with prior specific written direction, in which case the NFS shall perform such investigations in accordance with such written direction;

o) Assume, as between the Federal government and the NFS, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the Federal government determines to be required for construction, operation, and maintenance of the project, including those lands, structures and interests necessary for the implementation of all of the localized storm surge risk reduction components of the Project as described in this Report;

p) Agree, as between the Federal government and the NFS, that the NFS shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA; and

q) Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

r) Shall not use any project features or lands, easements, and rights-of-way required for such features as a wetlands bank or mitigation credit for any other project;

s) Pay all costs due to any project betterments or any additional work requested by the sponsor, subject to the sponsor's identification and request that the Government accomplish such betterments or

additional work, and acknowledgement that if the Government in its sole discretion elects to accomplish the requested betterments or additional work, or any portion thereof, the Government shall so notify the NFS in writing that sets forth any applicable terms and conditions.

The recommendations herein reflect the information available at the time and current Department of the Army policies governing the formulation of individual projects. They do not reflect programming and budgeting priorities inherent in the formulation of national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently the recommendations may be modified before they are transmitted to Congress as proposals for implementing funding. However, prior to the transmission to Congress, the state, Federal agencies and other parties will be advised of any modifications and afforded the opportunity to comment.

Richard L. Hansen
Colonel, U.S. Army
District Engineer

9.0 LIST OF PREPARERS (*NEPA Required)

Name	Office	Discipline/Role
Tim Axtman	RPEDS Plan Formulation Branch	Senior Plan Formulator
Christopher Brown	RPEDS Environmental Compliance Branch	HTRW
Michael Brown	RPEDS Environmental Compliance Branch	404(b)(1) Evaluation
Troy Constance	Chief, RPEDS	District Quality Control
Travis Creel	RPEDS, Plan Formulation Branch	Lead Plan Formulator
Rob Dauenhauer	Engineering Division, Structures Branch	Structures Design
Nathan Dayan	RPEDS Environmental Planning Branch	Environmental Manager, Fisheries Resources, Essential Fish Habitat
Pamela Deloach	Engineering Division, Engineering Control Branch	District Quality Control
Joan Exnicios	Chief, RPEDS Environmental Planning Branch	District Quality Control
Douglas Ferrell	Engineering Division, Design Services Branch	Relocations
Tammy Gilmore	RPEDS Environmental Planning Branch	Wildlife Resources, Endangered Species
Eric Glisch	Engineering Division, Hydraulics and Hydrologic Branch	Water Quality; 404(b)(1)
Richel Green	Engineering Division, Design Services Branch	Relocations
Judith Gutierrez	Real Estate Division	District Quality Control
Rebecca Hill	RPEDS Environmental Planning Branch	Tribal Liaison Coordination
Paul Hughbanks	RPEDS Environmental Planning Branch	Archaeology
William P. Klein Jr.	RPEDS Environmental Planning Branch	Environmental Manager, Planning, Habitat Impacts
Fay Lachney	RPEDS Plan Formulation Branch	Senior Plan Formulator
Mark Lahare	RPEDS Environmental Compliance Branch	Wetlands, Cumulative Impact Analysis
Patricia Leroux	RPEDS Environmental Planning Branch	Appendices, Vegetation Resources
J. Ben Logan	RPEDS Economics Branch	Socioeconomic Resources

Name	Office	Discipline/Role
Keven Lovetro	RPEDS Economics Branch	Socioeconomic Resources
Brian Maestri	RPEDS Economics Branch	Socioeconomic Resources
Greg Miller	Chief, RPEDS Plan Formulation Branch	Mitigation Plan; District Quality Control
Kelly McCaffrey	RPEDS Environmental Planning Branch	Aesthetic Resources
Joe Musso	RPEDS Environmental Compliance Branch	Air Quality; HTRW
An Nguyen	Engineering Division, Civil Branch	Levee Design
Darrell Normand	Engineering Division, Design Services Branch	Cost Engineering
Paul Oakland	Engineering Division, Design Services Branch	Relocations
Hasan Pourtaheri	Engineering Division, Hydraulics and Hydrologic Branch	ADCIRC & Surge Modeling
Miguel Ramos	Engineering Division, Design Services Branch	Cost Engineering
Courtney Reed	RPEDS Economics Branch	Socioeconomic Resources
Jerica Richardson	RPEDS, Plan Formulation Branch	Plan Formulator, Environmental Justice
Sandra Stiles	RPEDS Environmental Planning Branch	District Quality Control
Daniel Sumerall	RPEDS Environmental Planning Branch	Coastal Zone Consistency
Christopher Talbert	Engineering Division, Design Services Branch	Relocations
Danielle Tommaso	RPEDS, Plan Formulation Branch	Plan Formulator
Ron Taylor	Engineering Division, Hydraulics and Hydrologic Branch	Interior Drainage
Walter Teckemeyer	Engineering Division, Engineering Control Branch	Project Engineer
Jeff Varisco	Programs & Project Management Division	Project Manager
Jennifer Wedge	Engineering Division, Structures Branch	Structures Design
Laura Lee Wilkinson	RPEDS Environmental Planning Branch	Noise
Debra Wright	RPEDS Environmental Planning Branch	Recreational Resources

Map Annex

Below are maps discussed in the Main Report Integrated Final Feasibility Report & EIS

1.0 INTRODUCTION

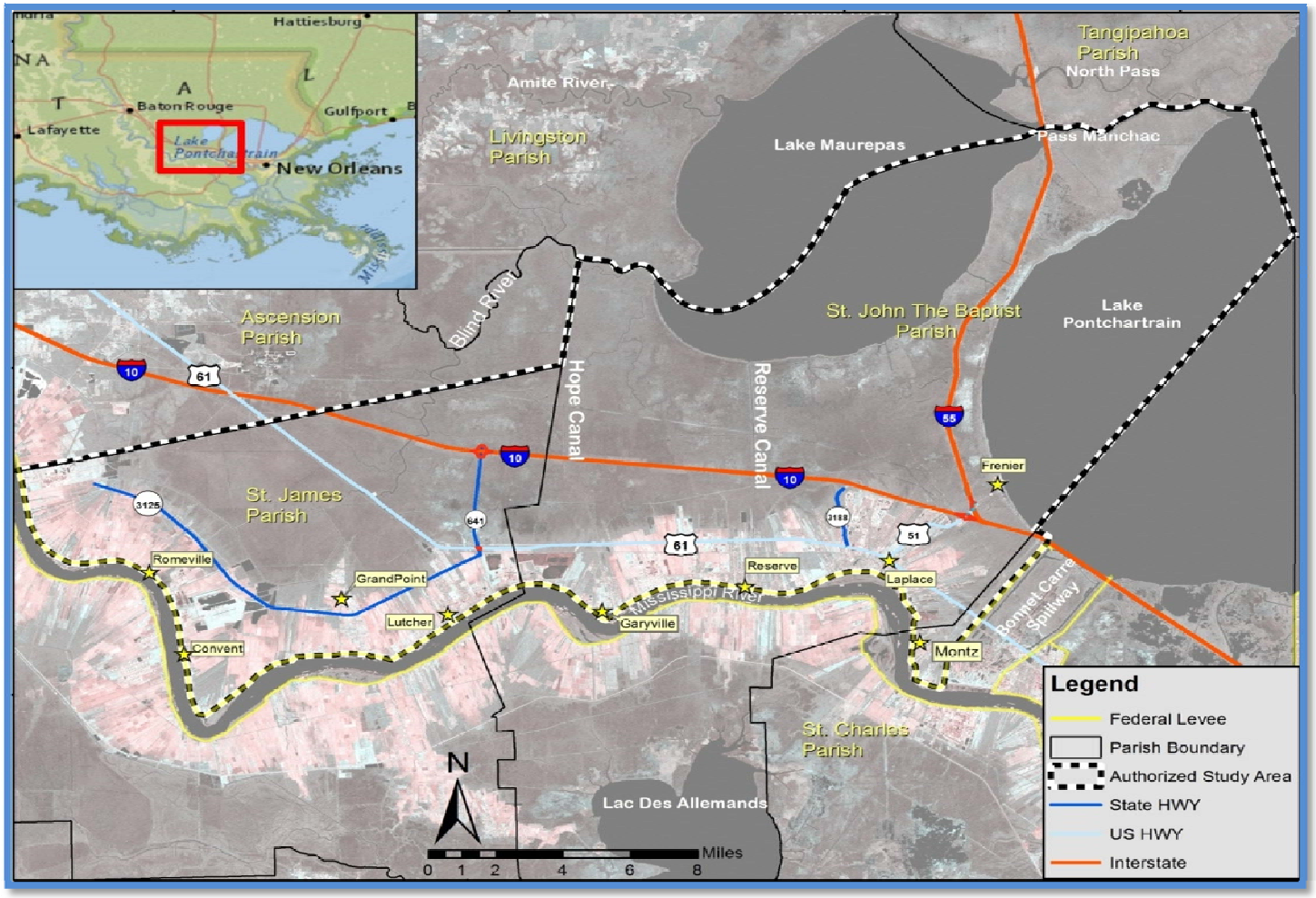


Figure 1-1: West Shore Lake Pontchartrain authorized study area.

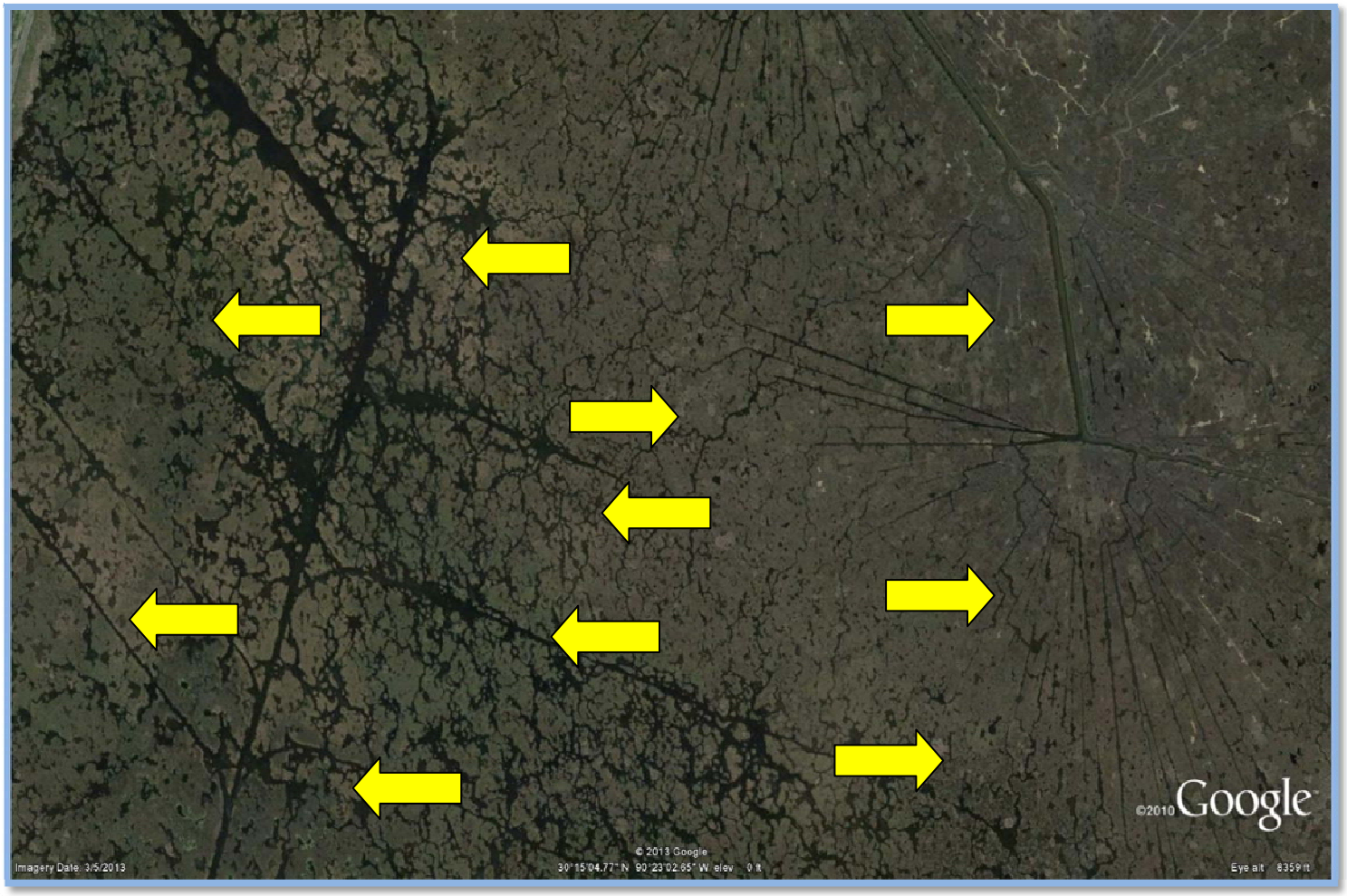


Figure 1-2: Old logging canals in Maurepas Swamp.

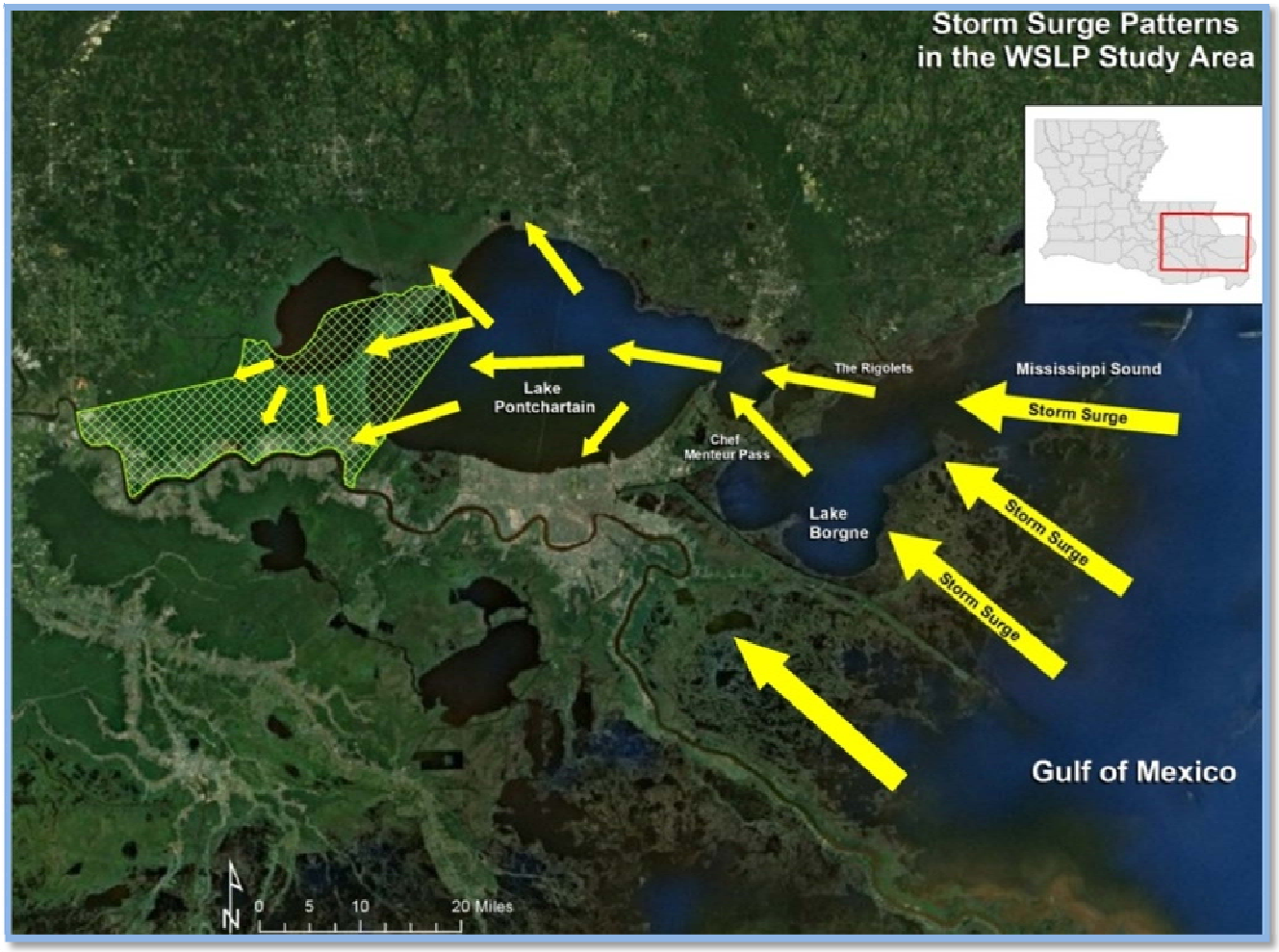


Figure 1-3: Area storm surge patterns.

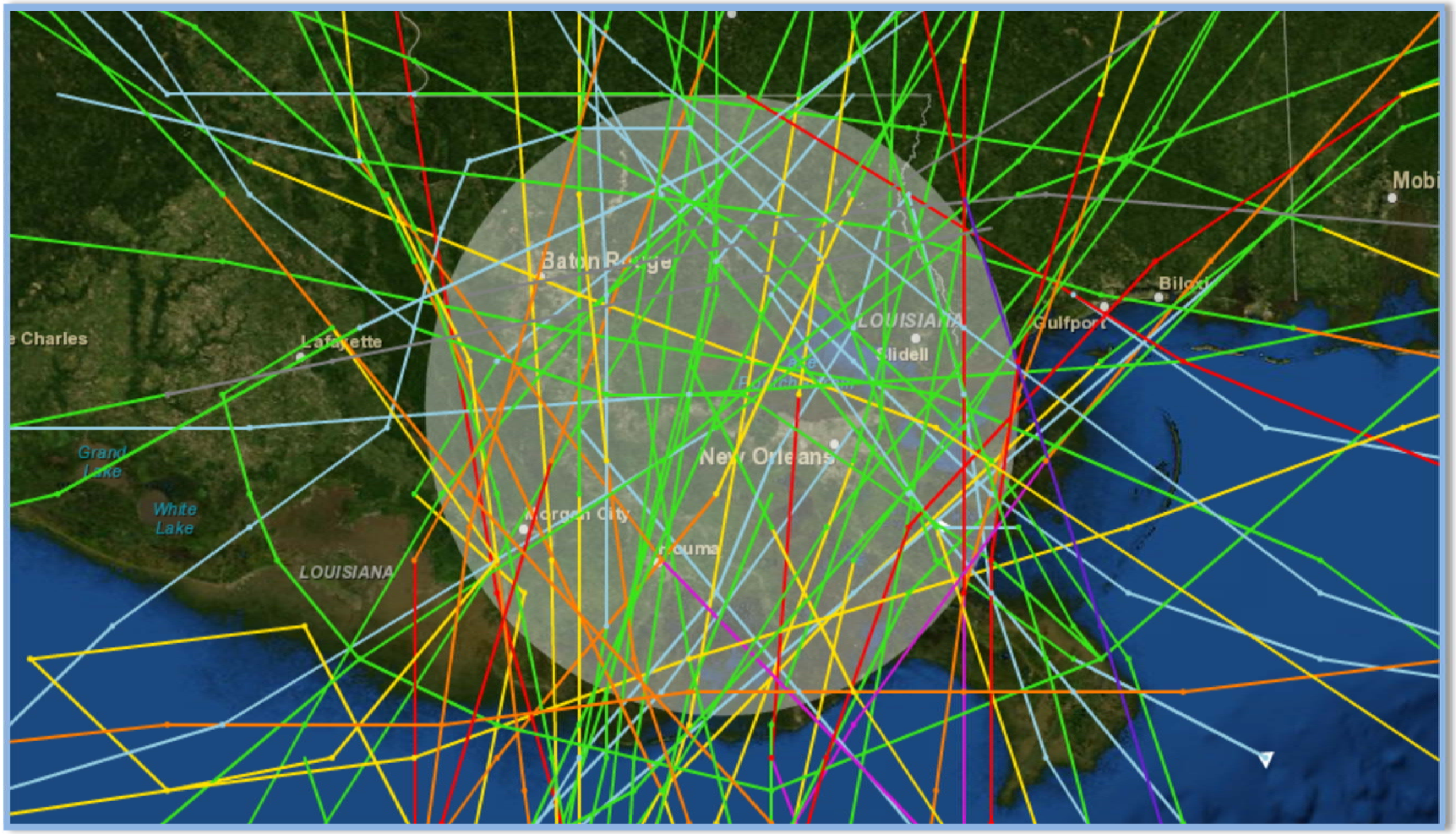


Figure 1-4: Hurricane tracks within 65 nautical miles of Laplace, Louisiana (NOAA 2013).

Figure 1-5: Hurricane Isaac flooding in Laplace, Louisiana (September 3, 2012, Getty Images & Times-Picayune).

2.0 AFFECTED ENVIRONMENT

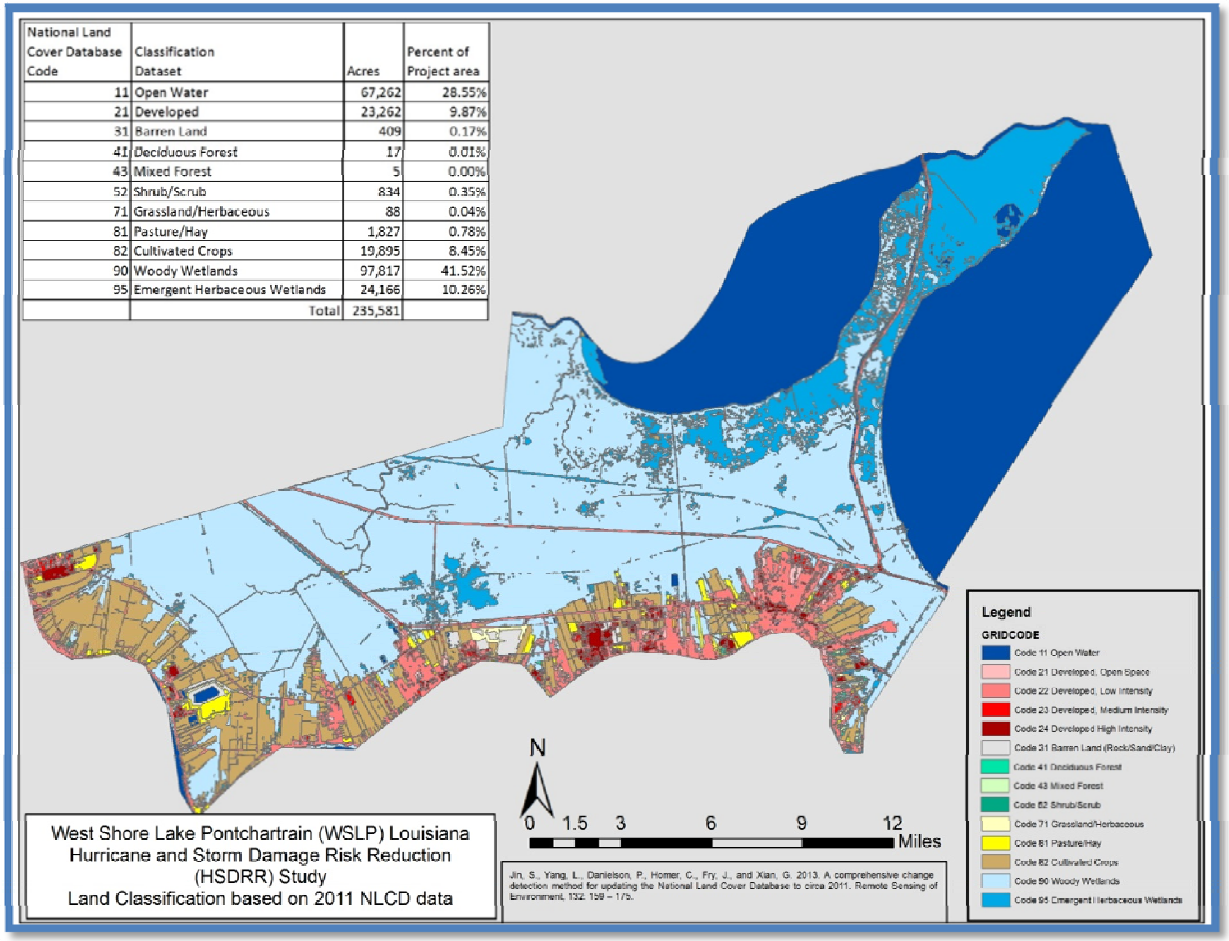


Figure 2-1: WSLP Land Classification Map.

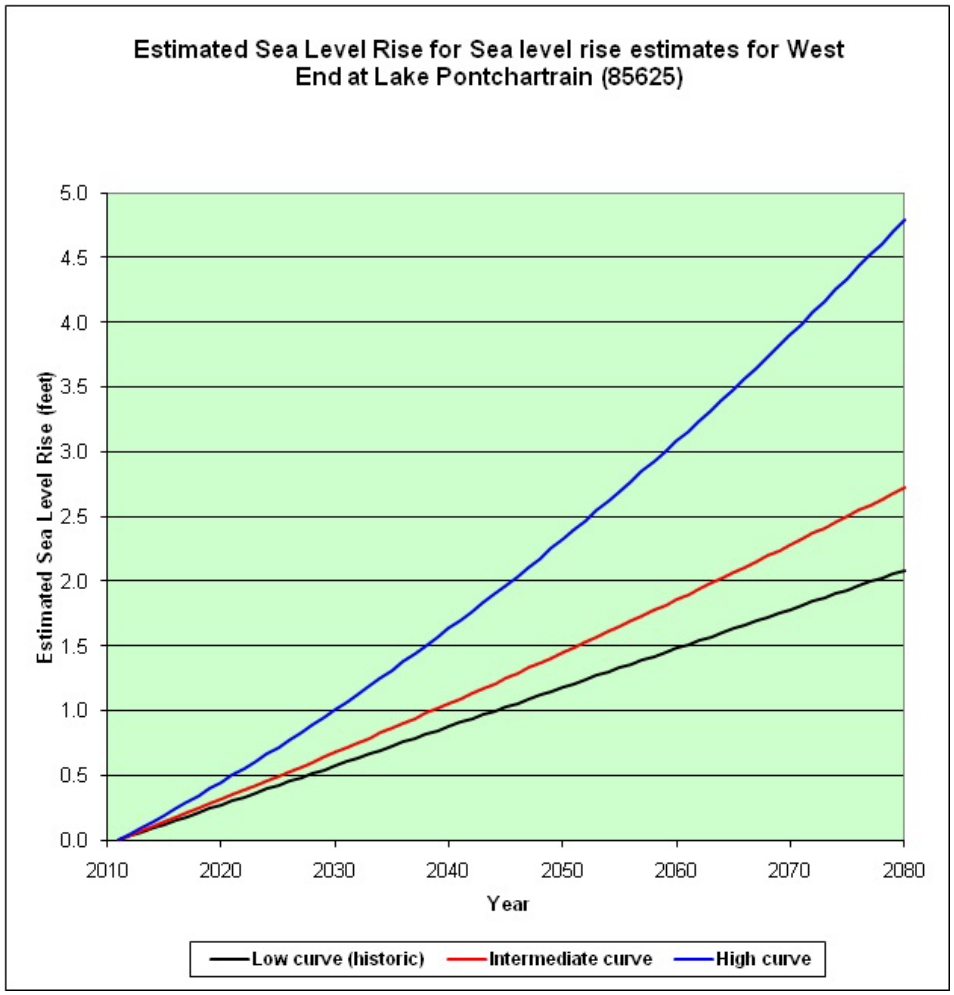


Figure 2-2: Relative sea level rise in the project area.

Figure 2-3: Hurricane Isaac storm surge flooding in Laplace.

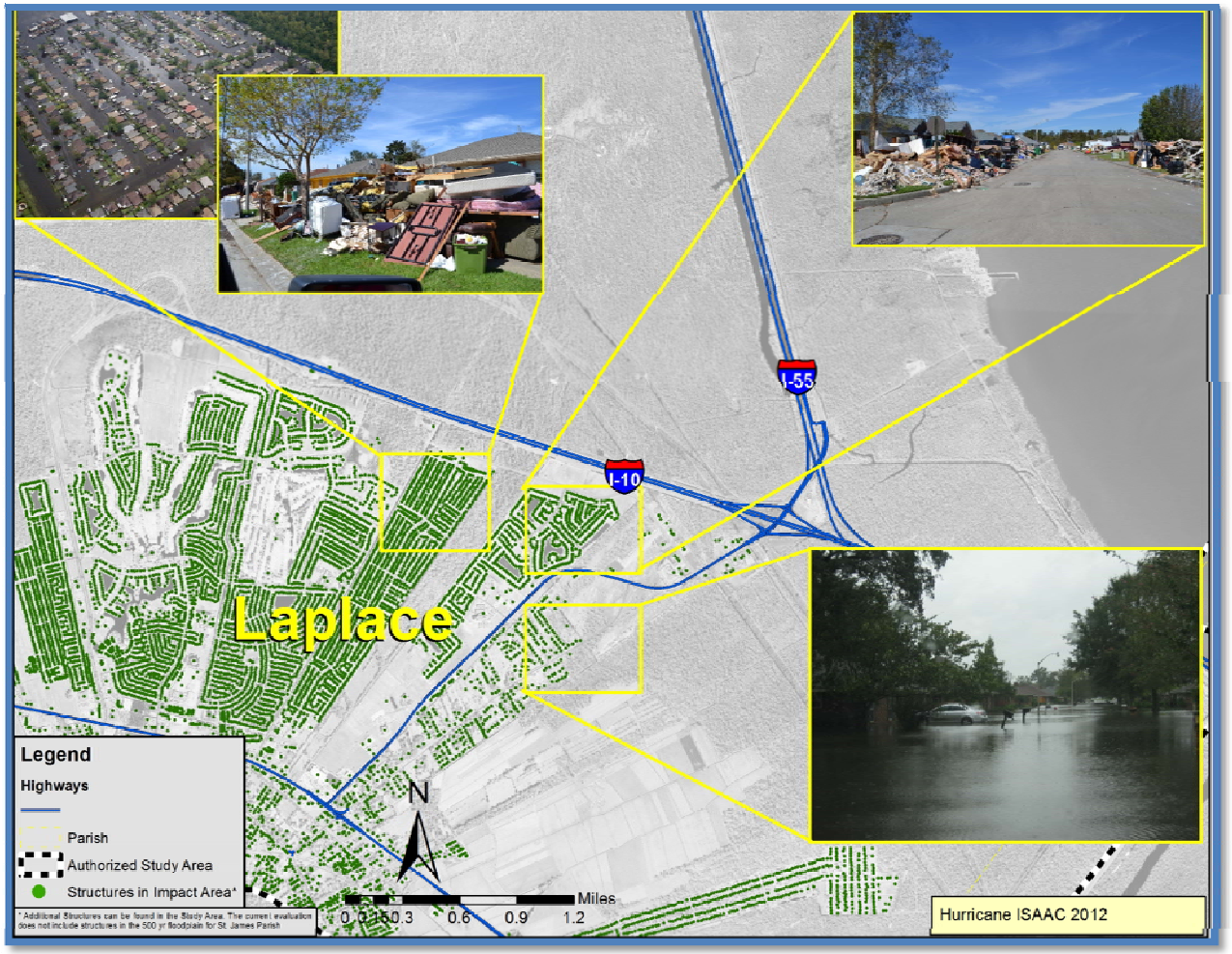
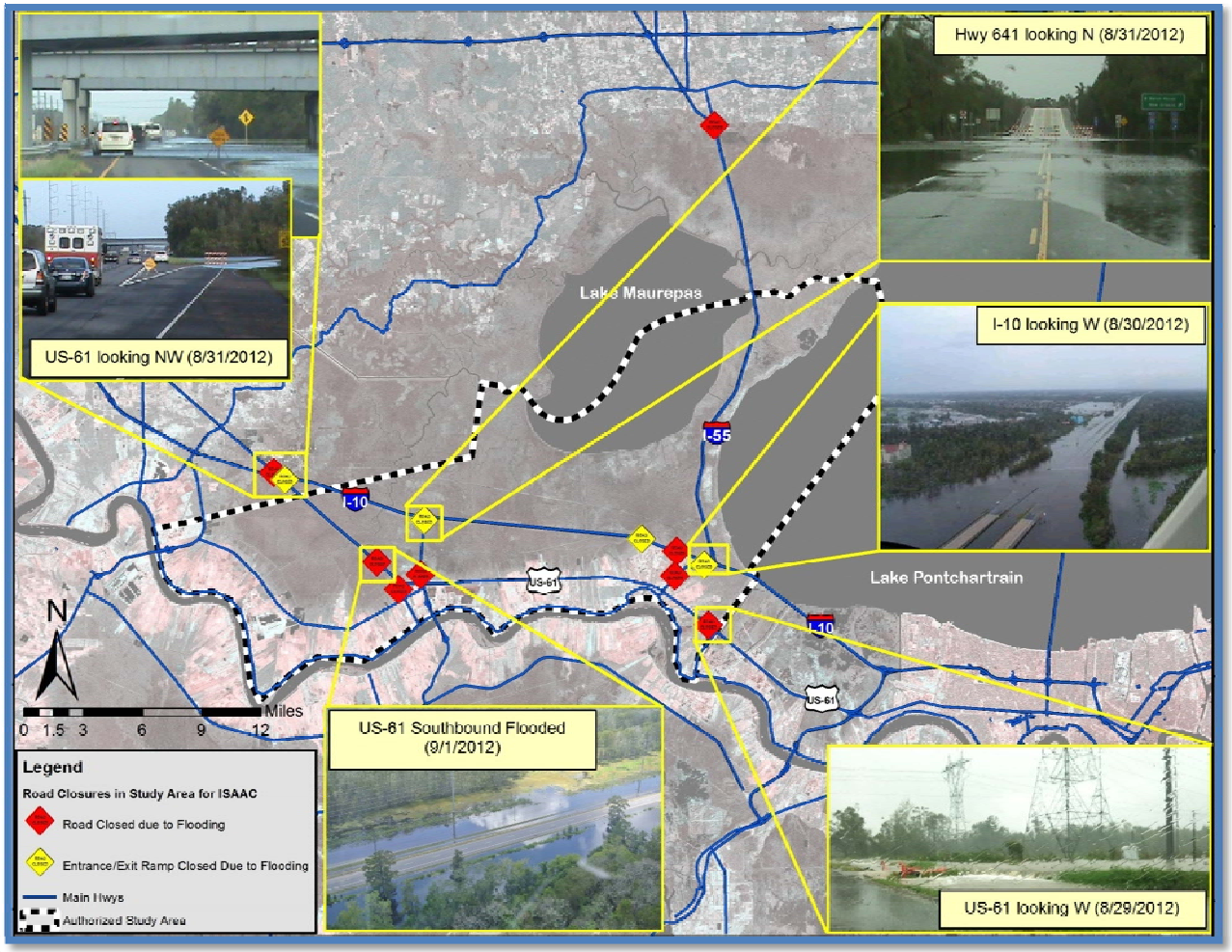


Figure 2-4: Hurricane Isaac storm surge flooding of important transportation routes.



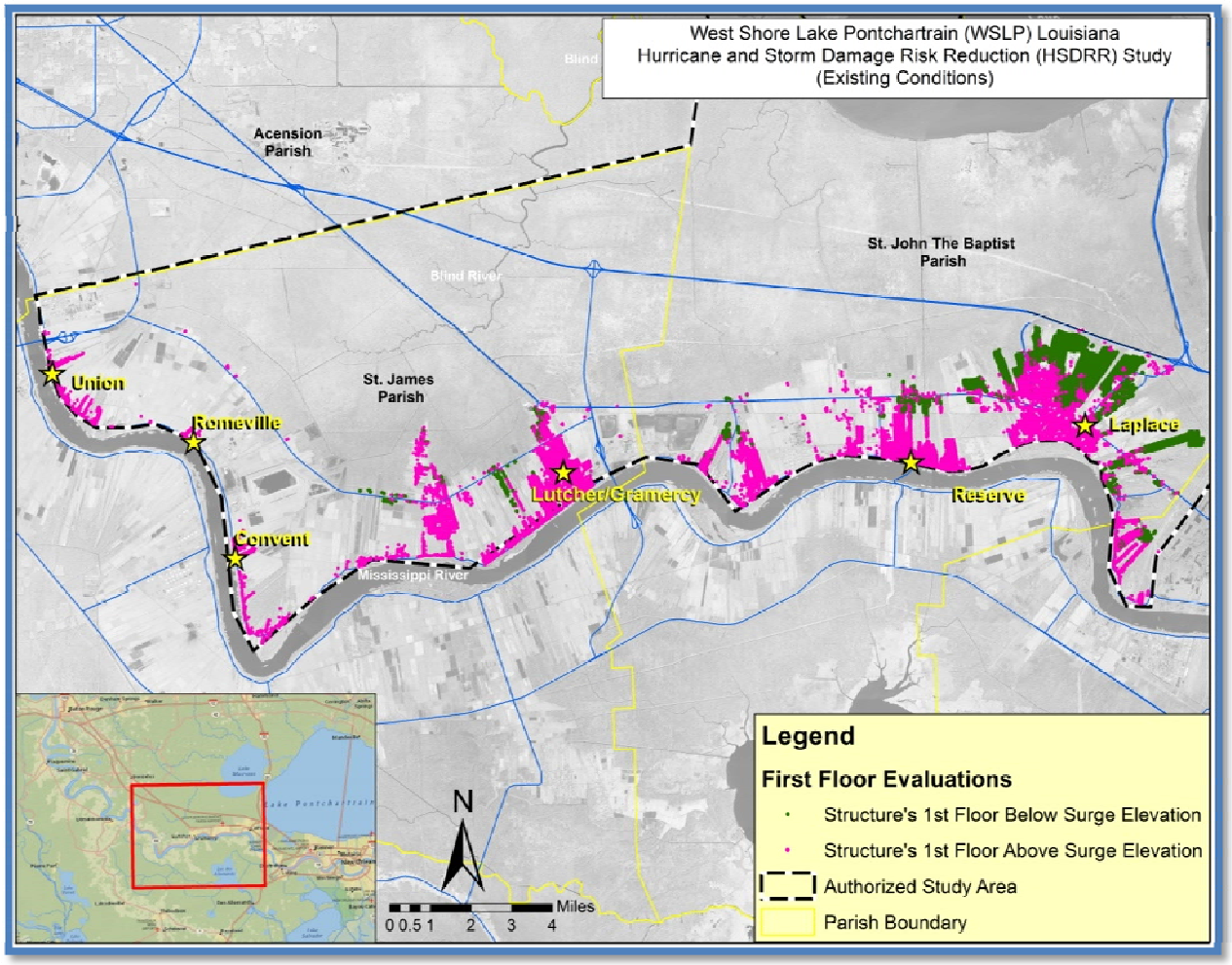


Figure 2-5: First floor evaluations (existing conditions).

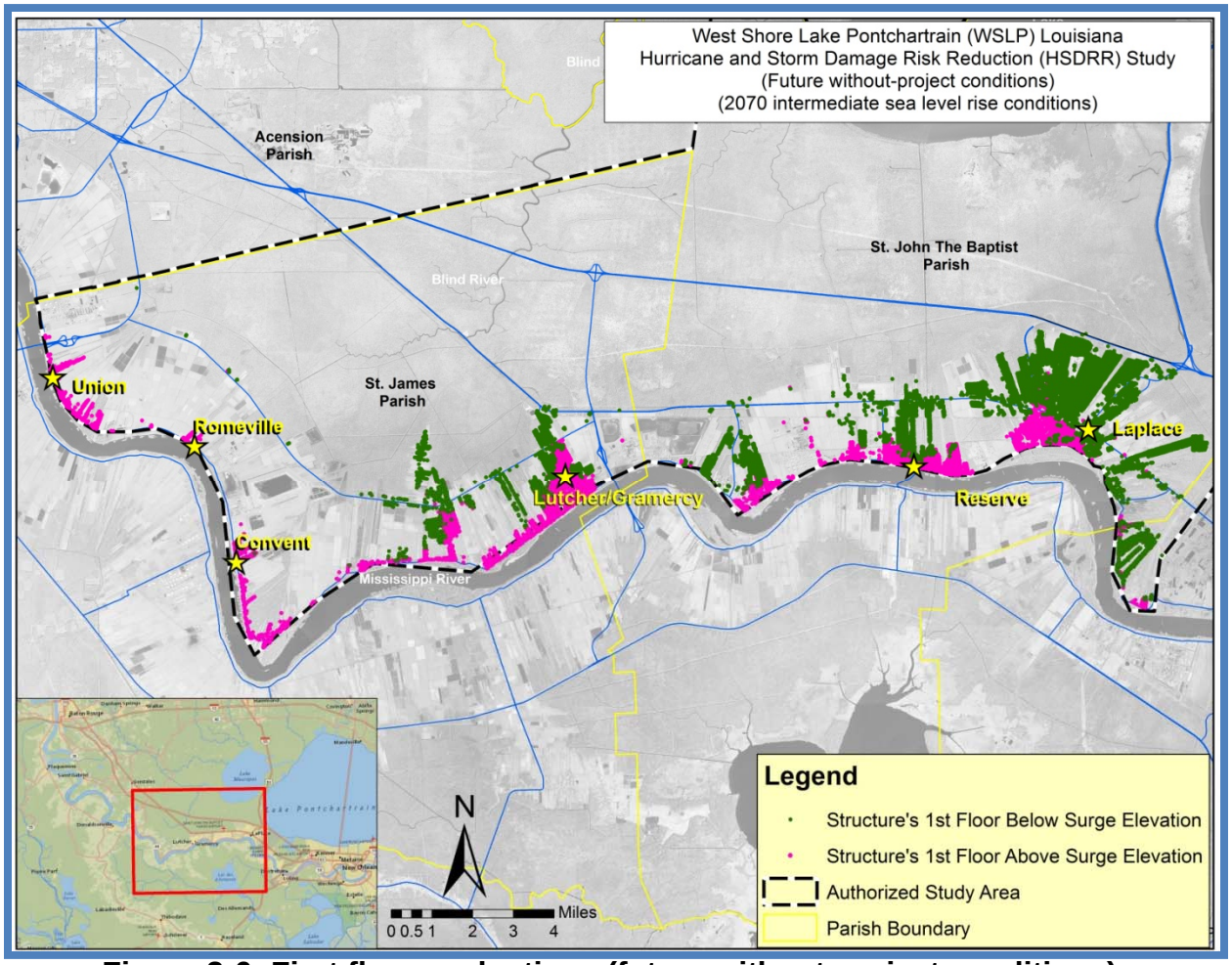


Figure 2-6: First floor evaluations (future without-project conditions).

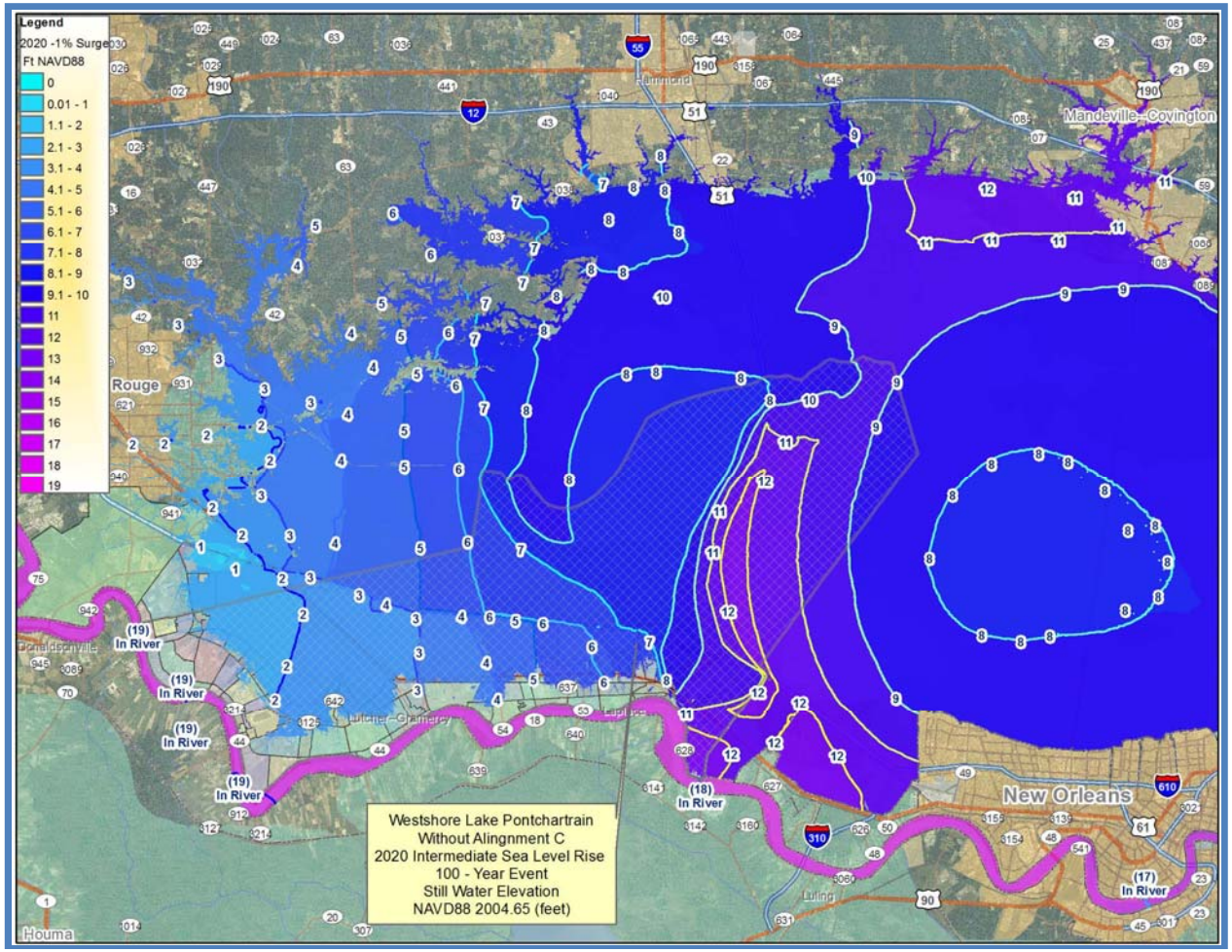


Figure 2-7: 100YR Still Water Elevations for 2020-Intermediate Condition – Without Project

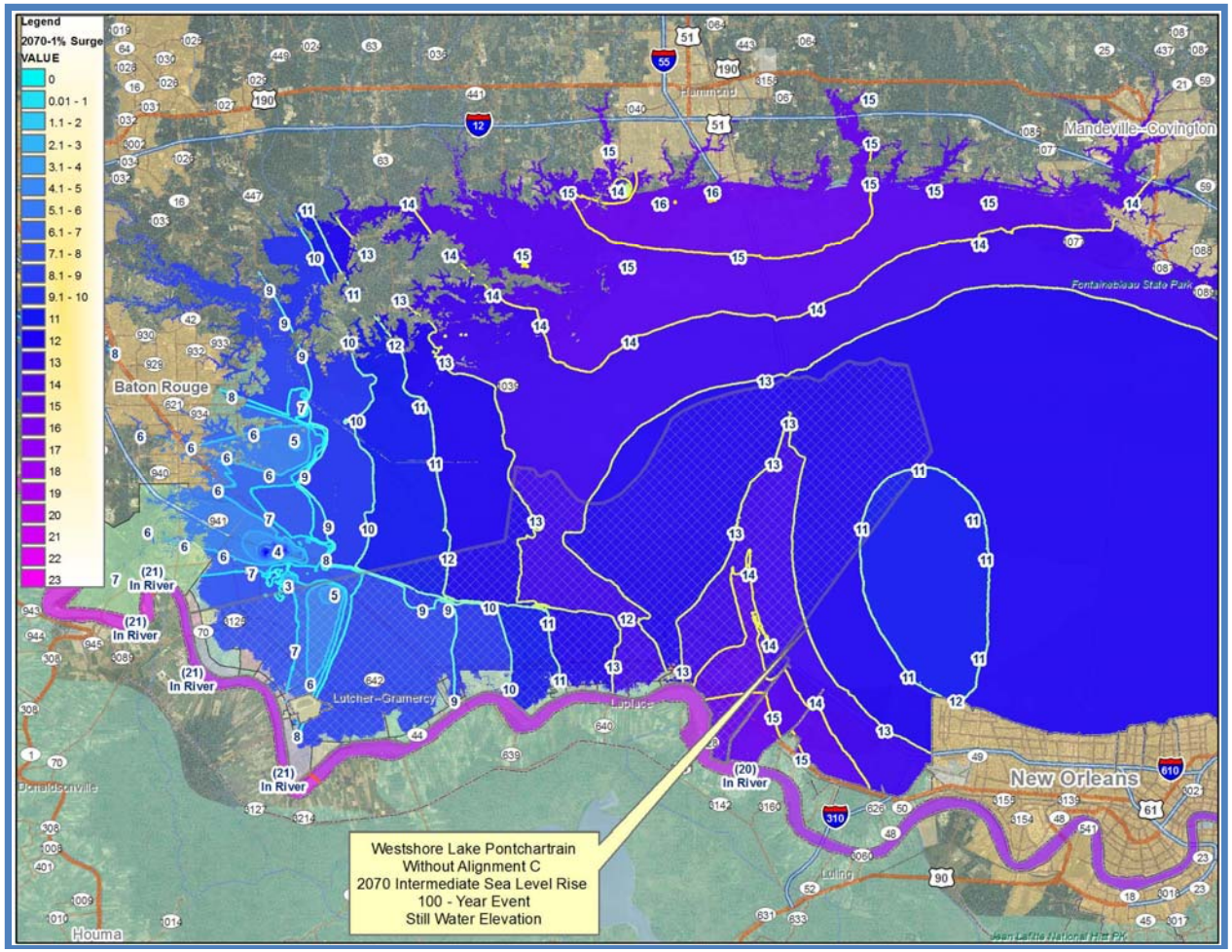


Figure 2-8: 100YR Still Water Elevations for 2070-Intermediate Condition – Without Project

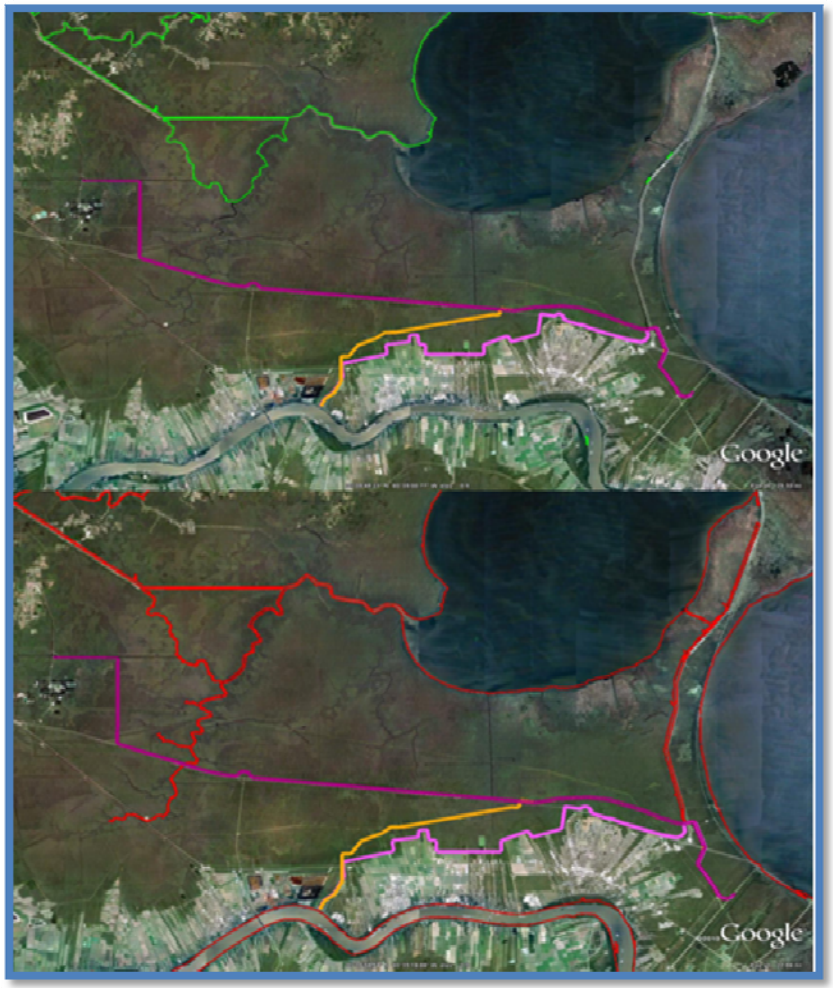


Figure 2-9: EFH for white shrimp (green) and red drum (red).

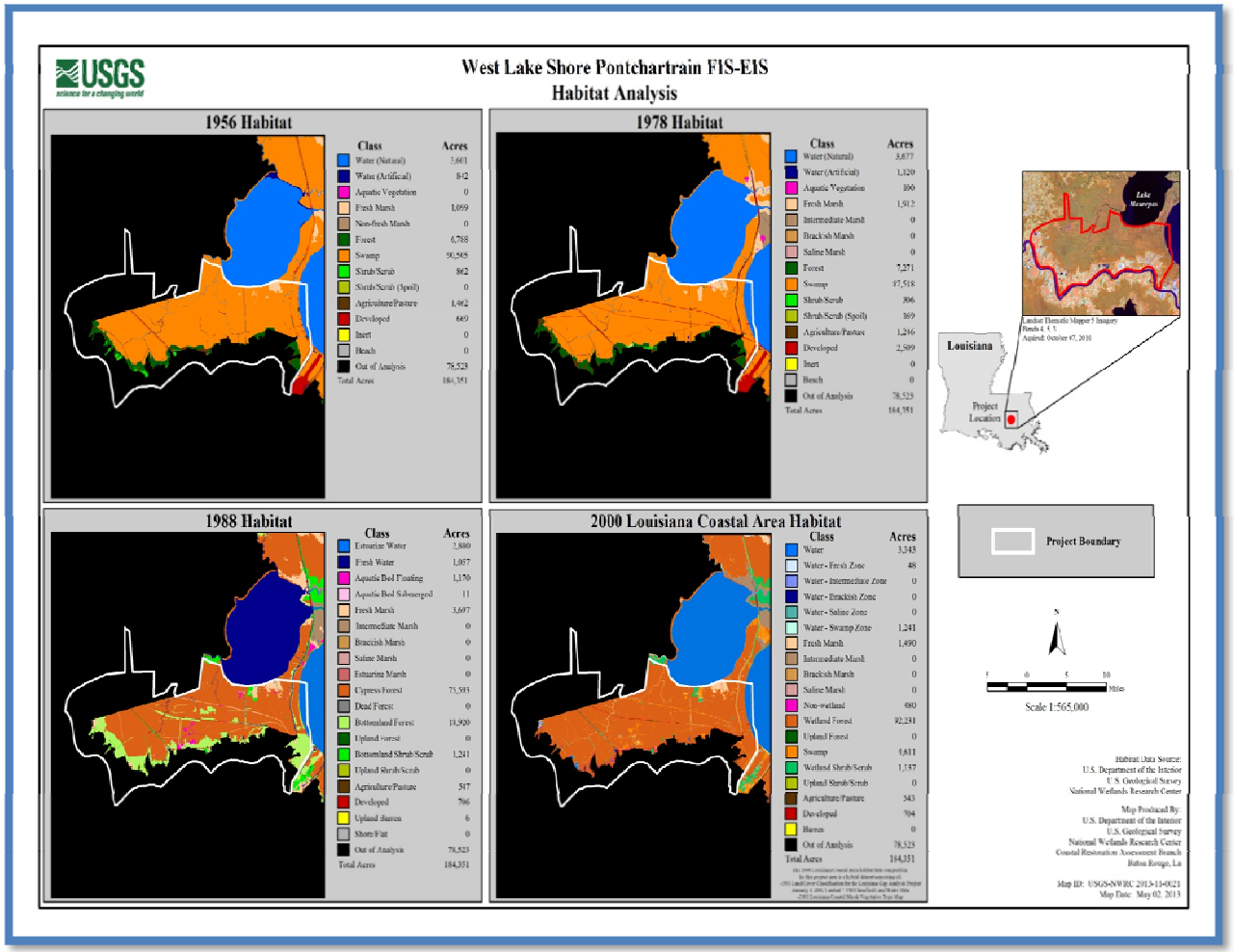


Figure 2-10: Habitats and land loss within the project area.

3.0 PLAN FORMULATION

Figure 3-1: Typical levee, floodwall (T-wall) and control structure.

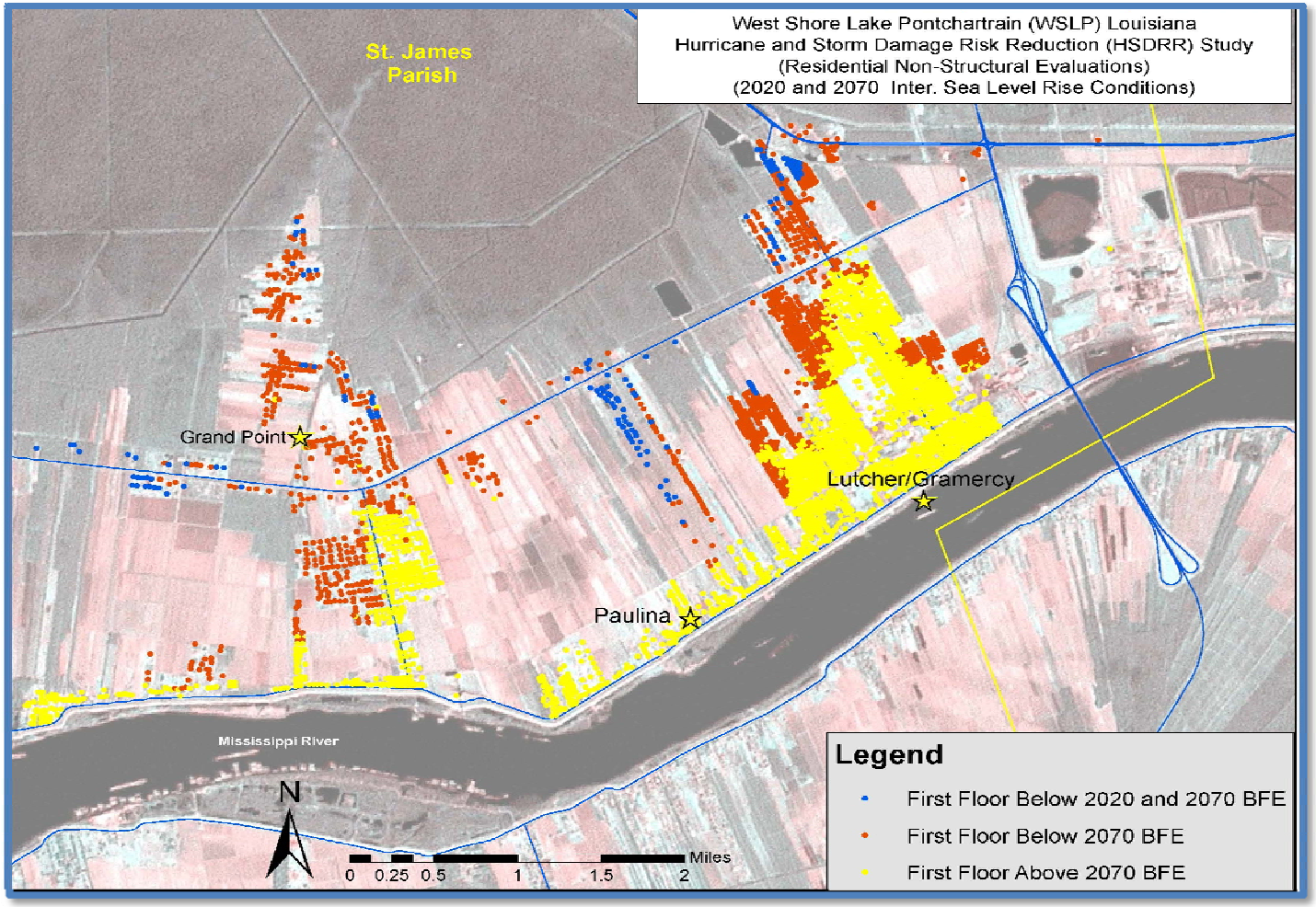


Figure 3-2: Supplemental nonstructural plan area in St. James Parish.

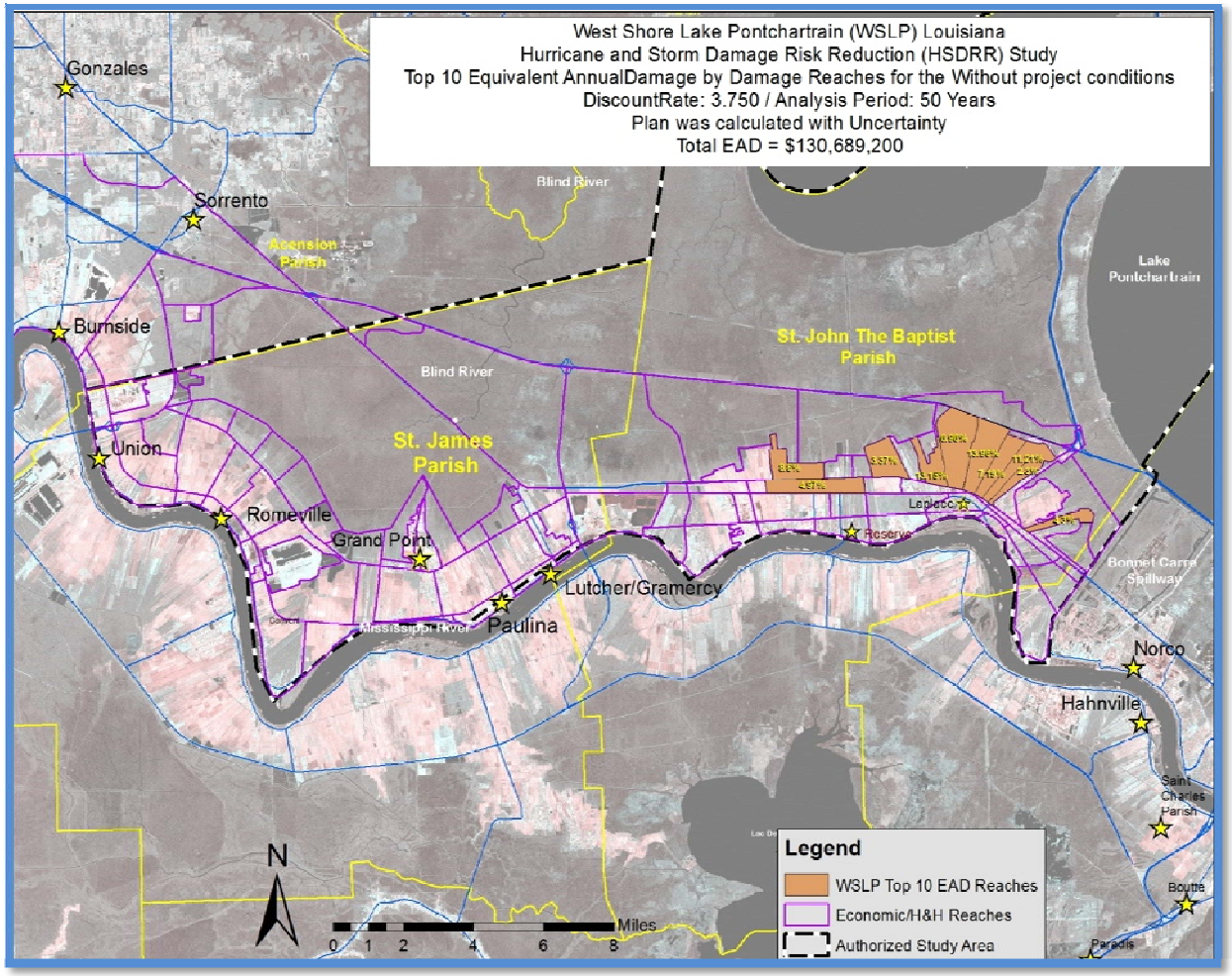


Figure 3-3: Economic reaches, FWOP condition.

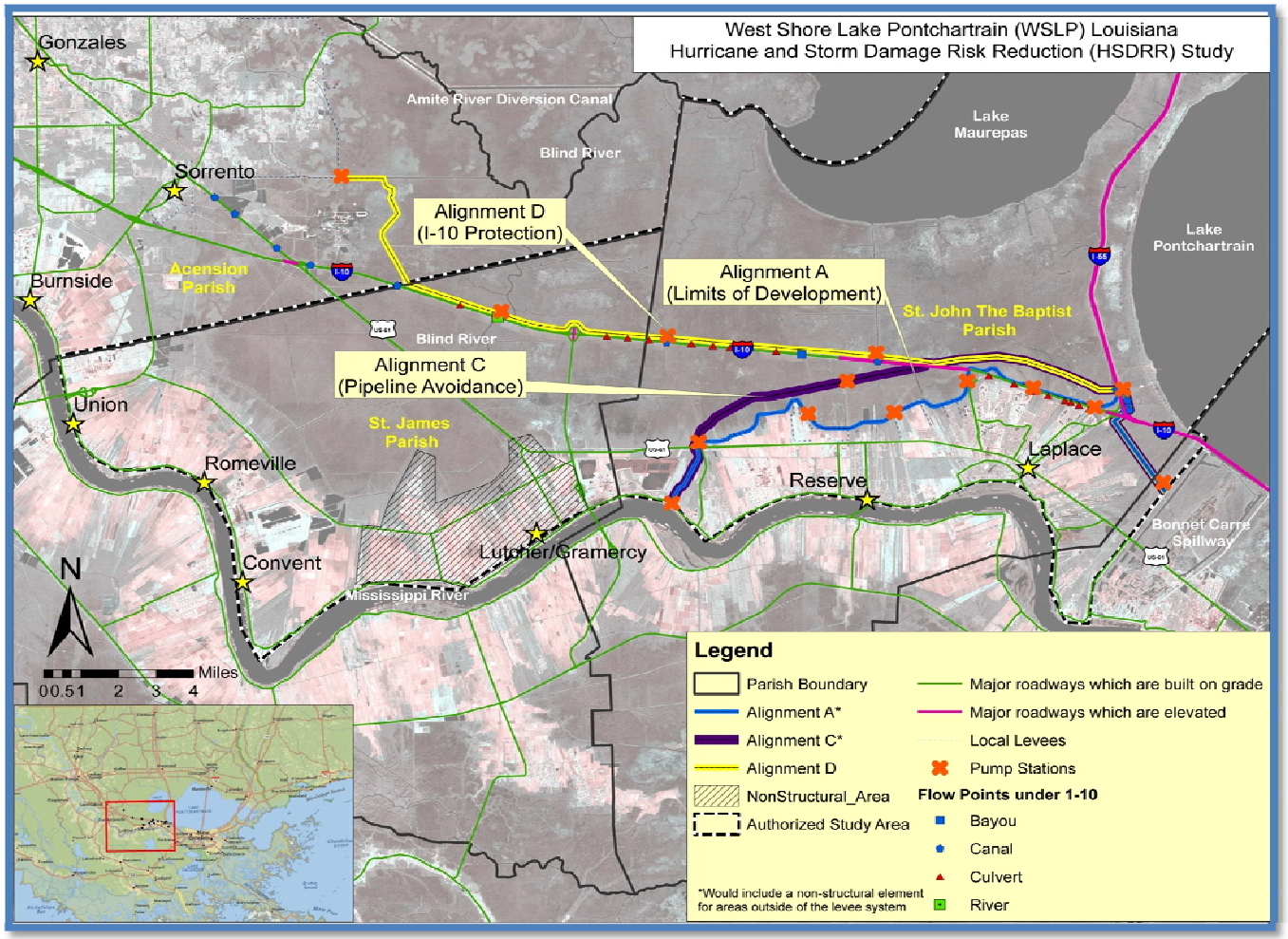


Figure 3-4: Final array of alternative plans.

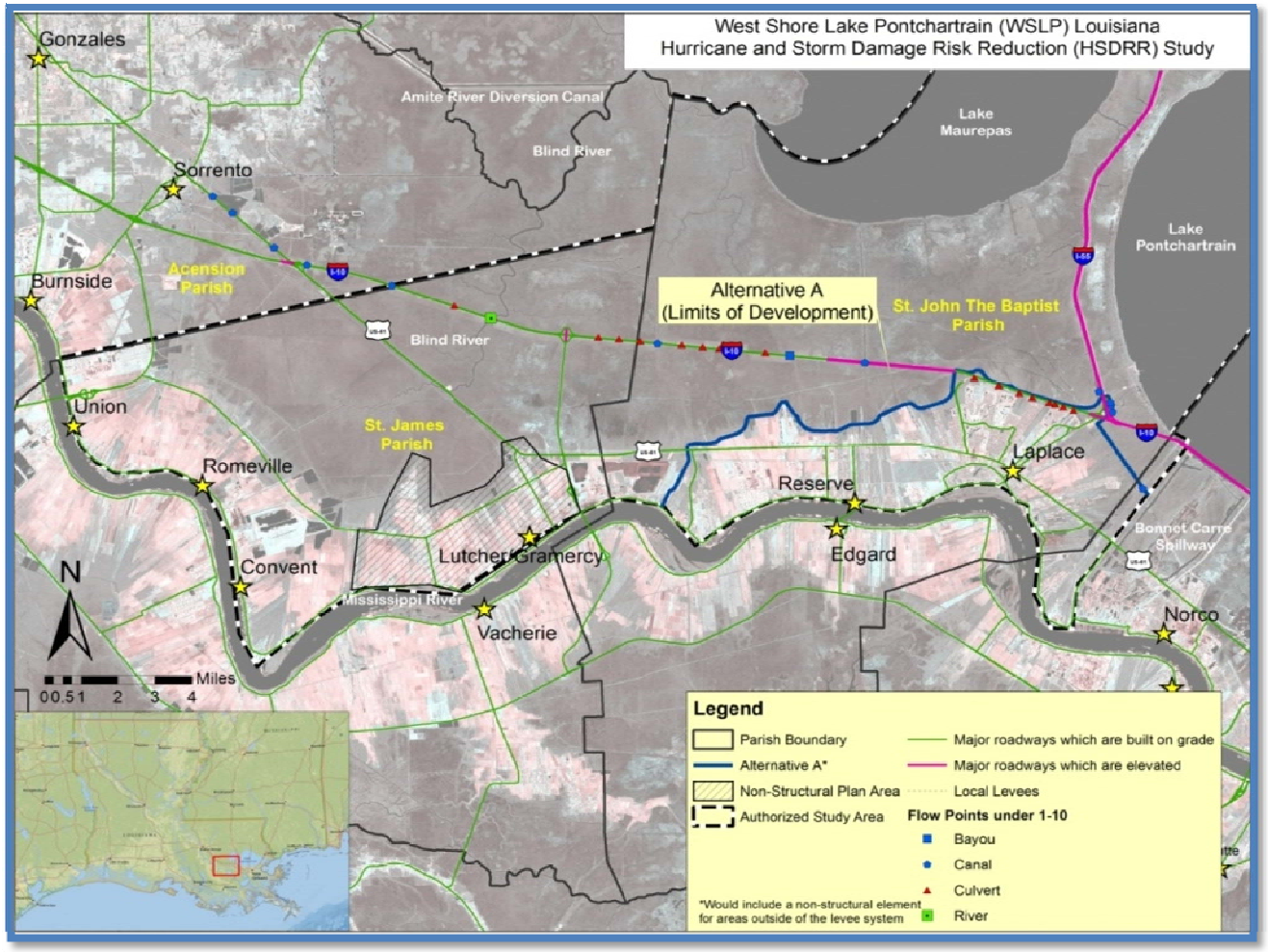


Figure 3-5: Alignment and features of Alternative A.

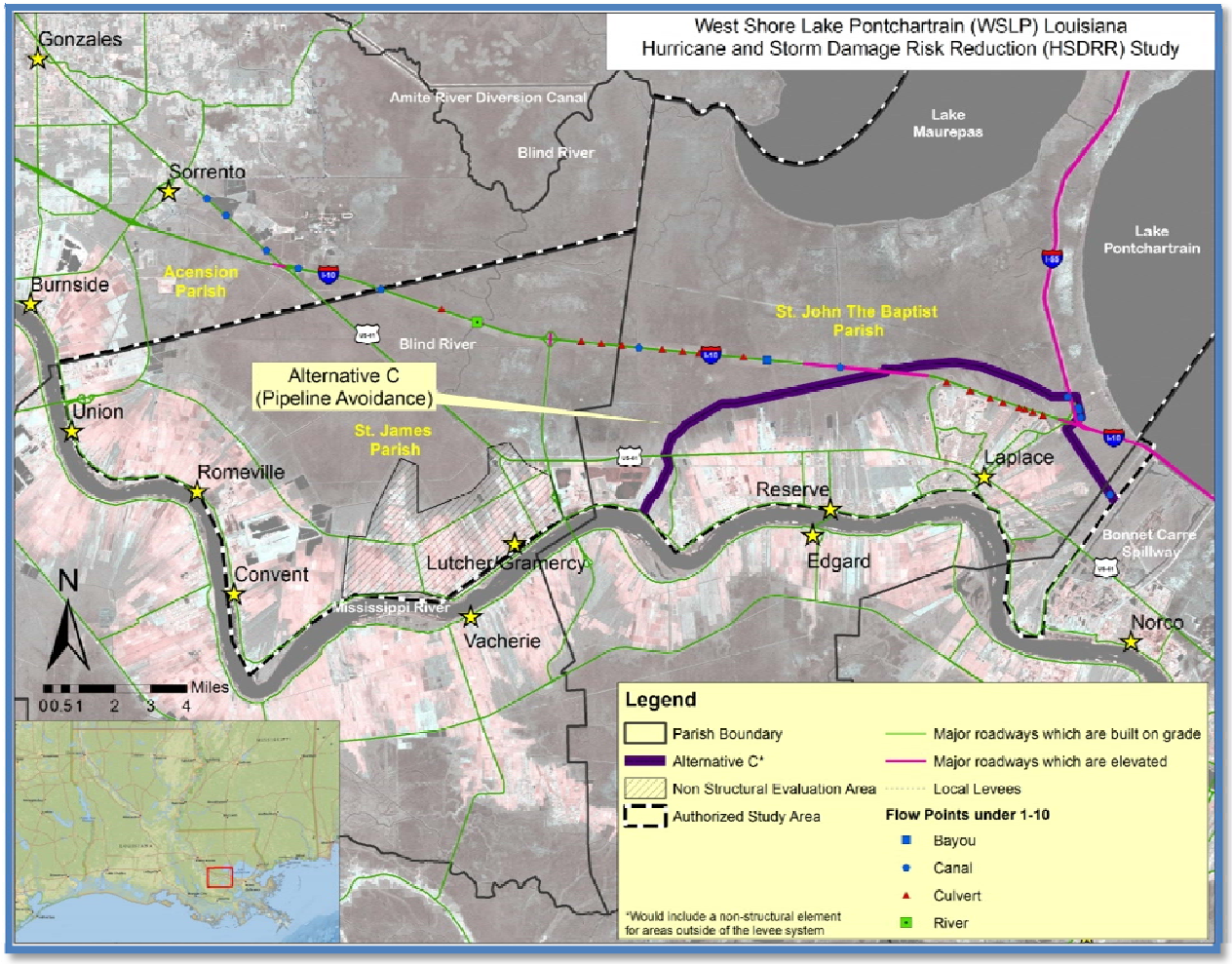


Figure 3-6: Alignment and features of Alternative C.

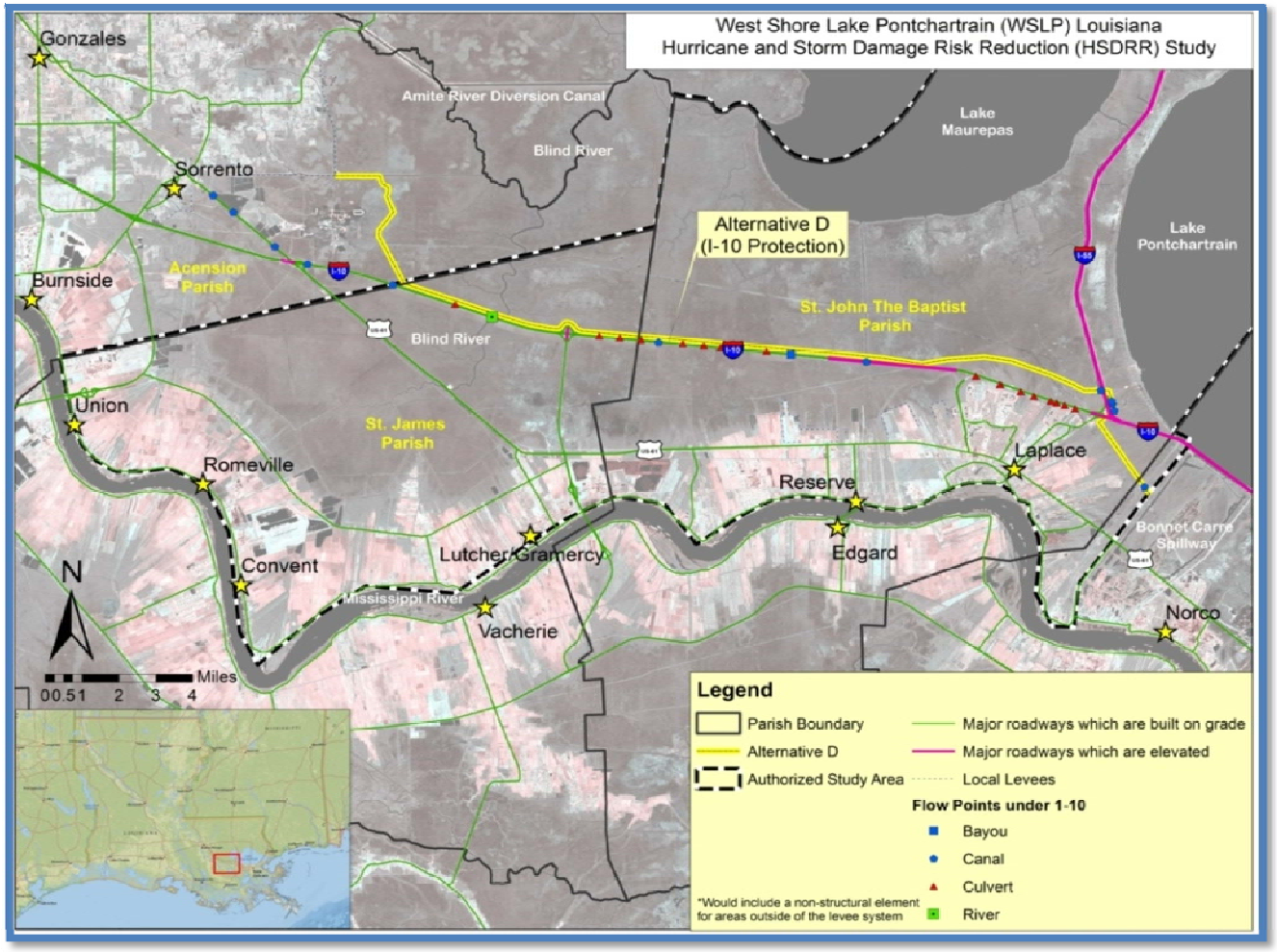


Figure 3-7: Alignment and features of Alternative D.

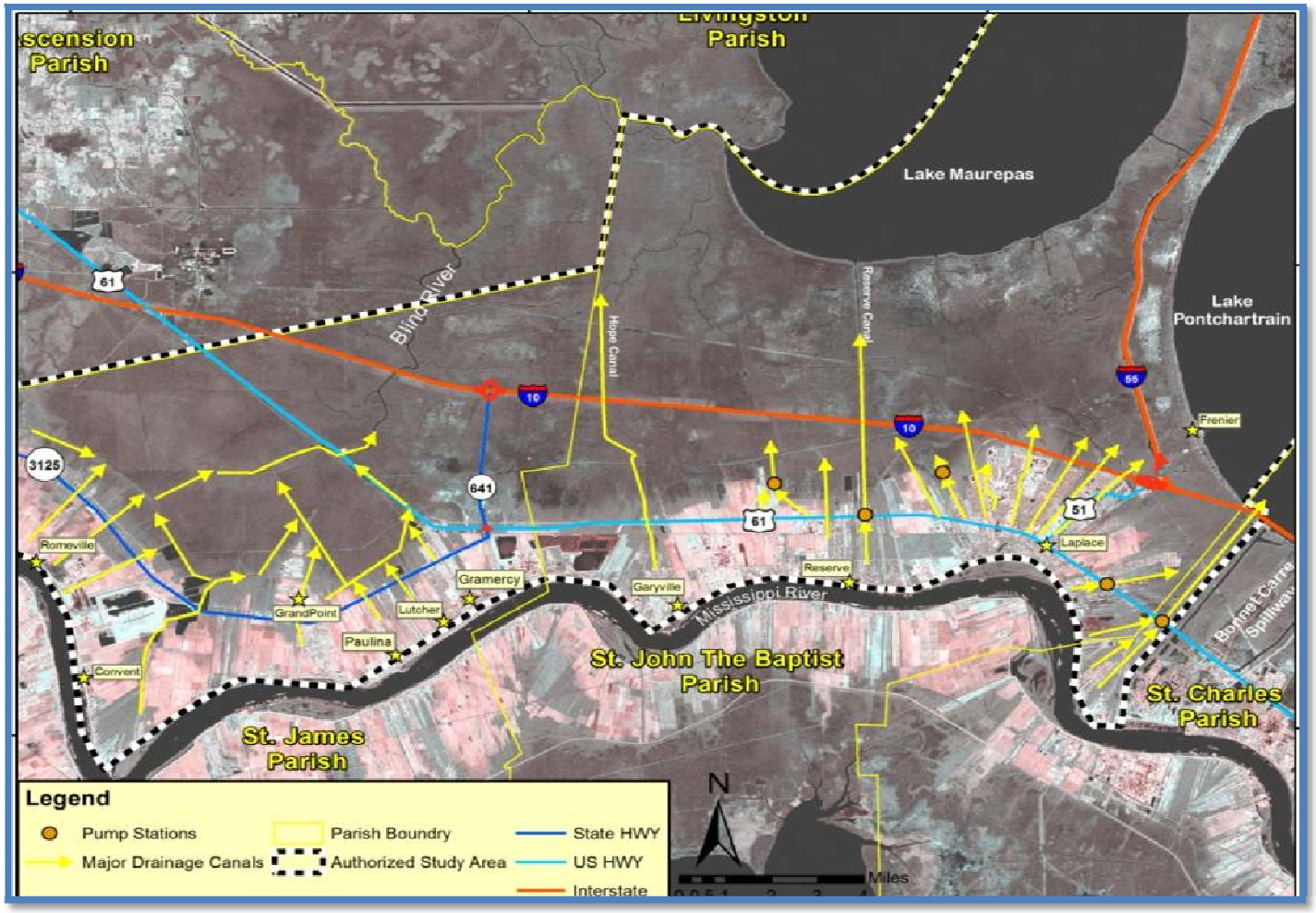


Figure 3-8: Study area drainage patterns.

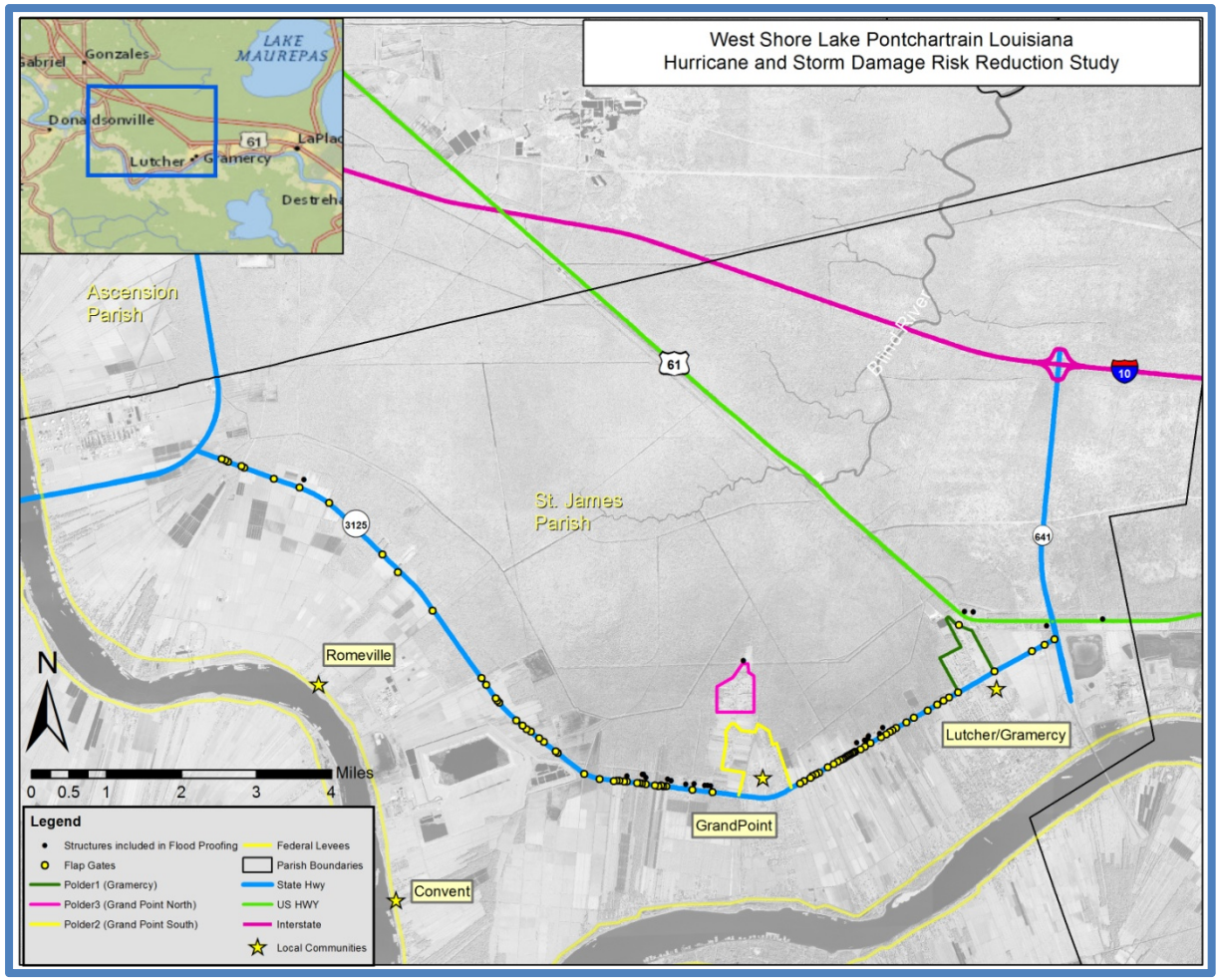


Figure 3-9: Details of further developed localized storm surge risk reduction component

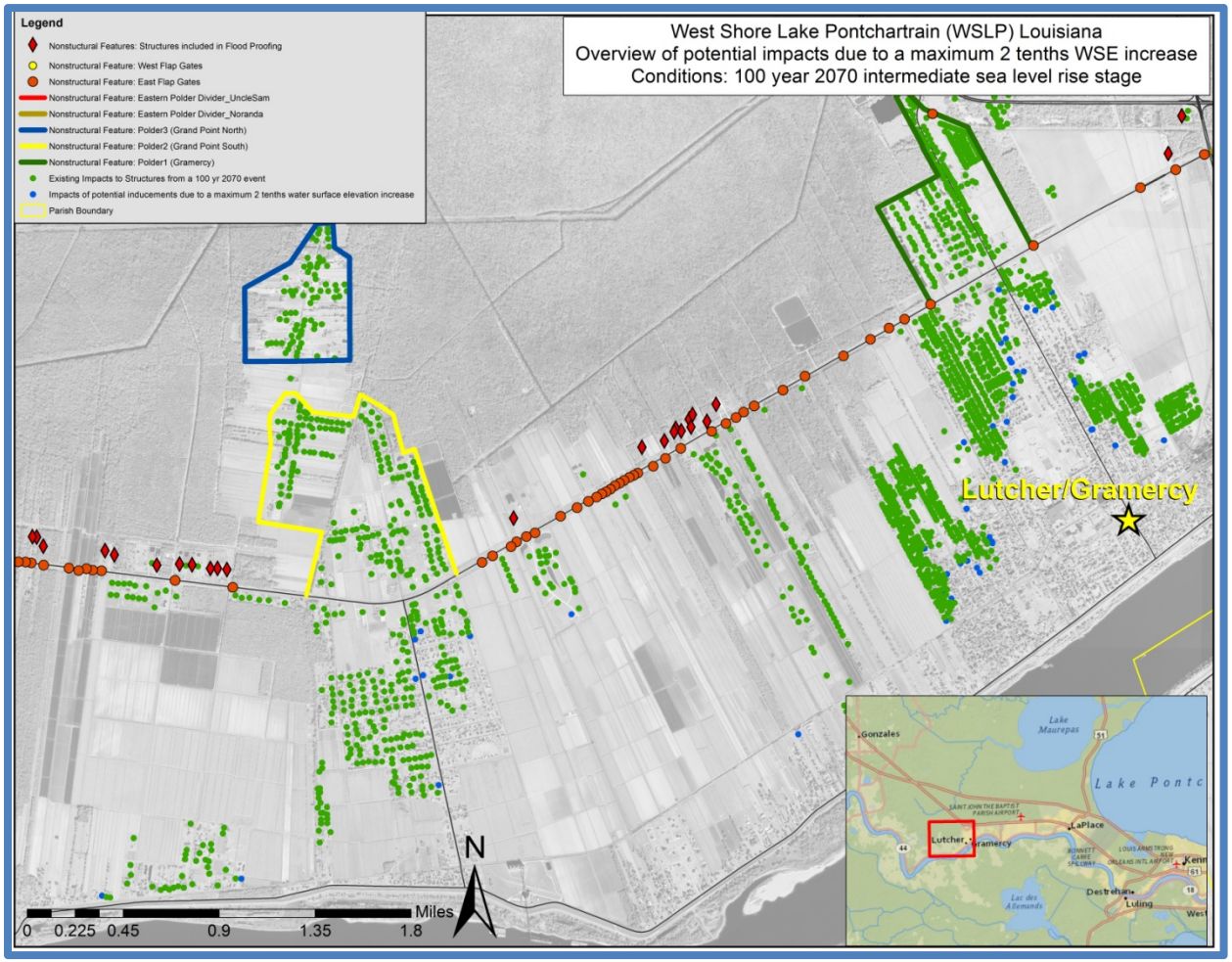


Figure 3-10: Overview of potential impacts due to a maximum 2th WSE increase.

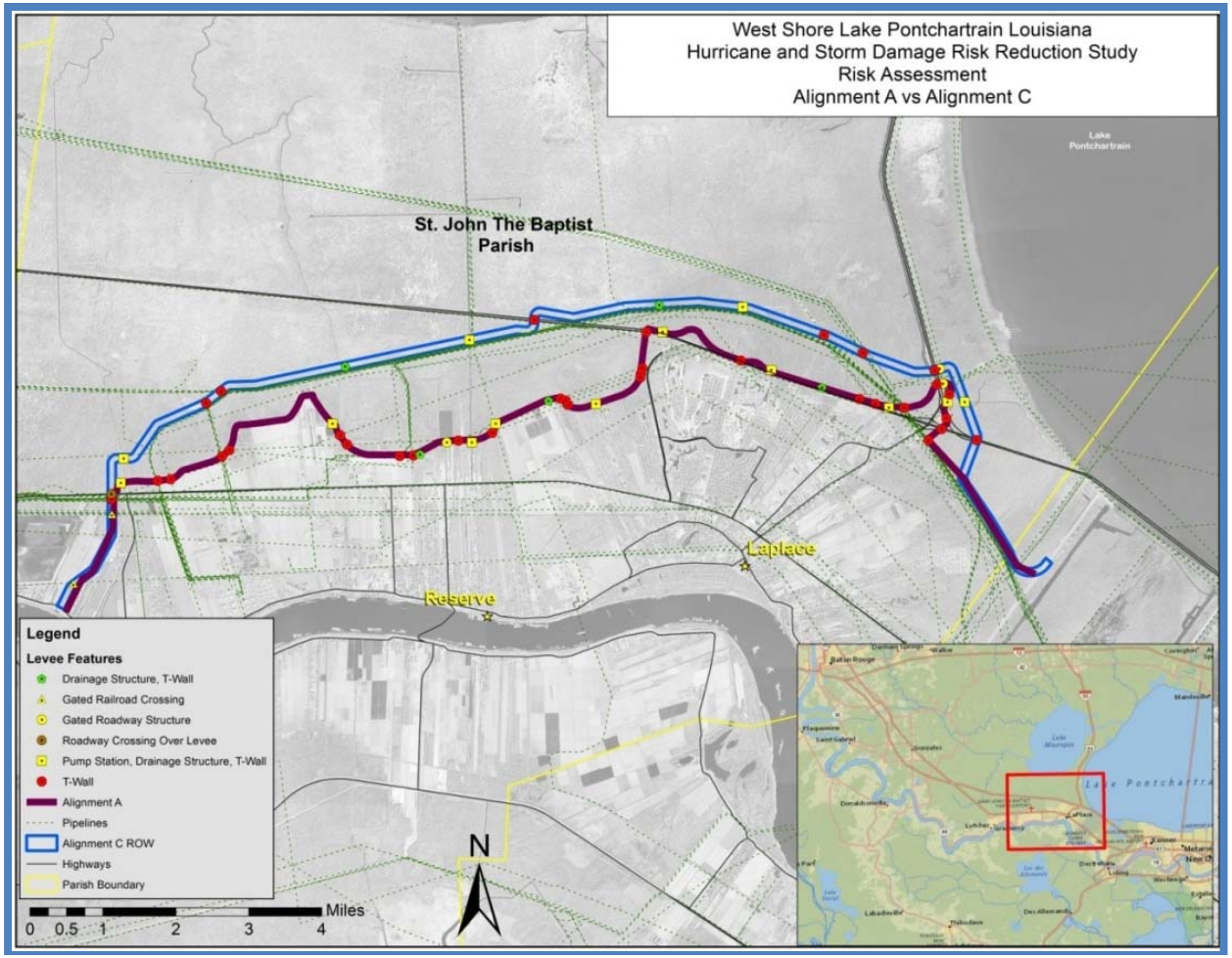


Figure 3-11: Capability Assessment of Alternative A.

4.0 ENVIRONMENTAL CONSEQUENCES (*NEPA REQUIRED)

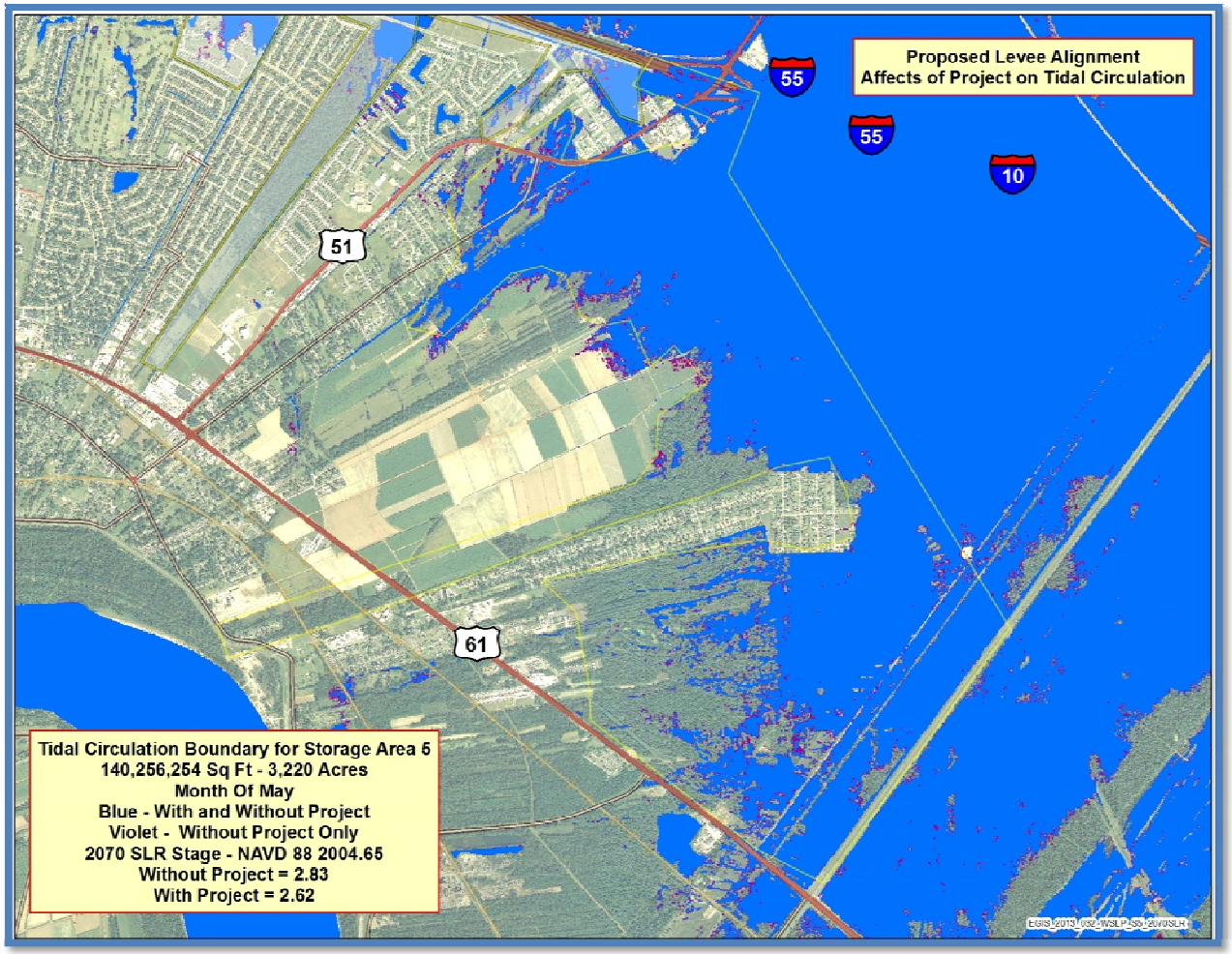


Figure 4-1: Model results of with and without proposed levee alignment affects on tidal circulation.

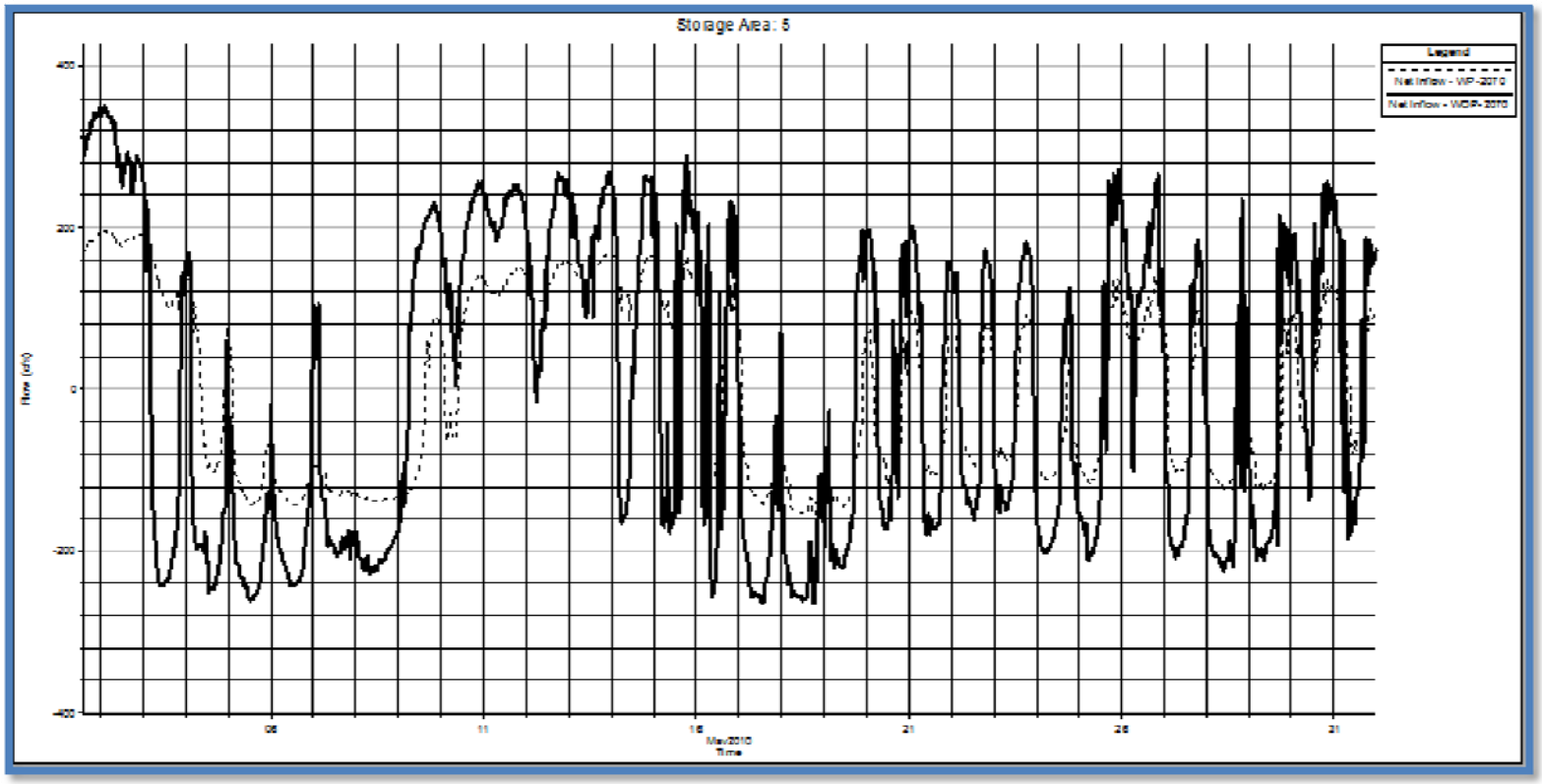


Figure 4-2: Modeling simulation flows during month of May for Area 5 (near Bonnet Carré guide levee).

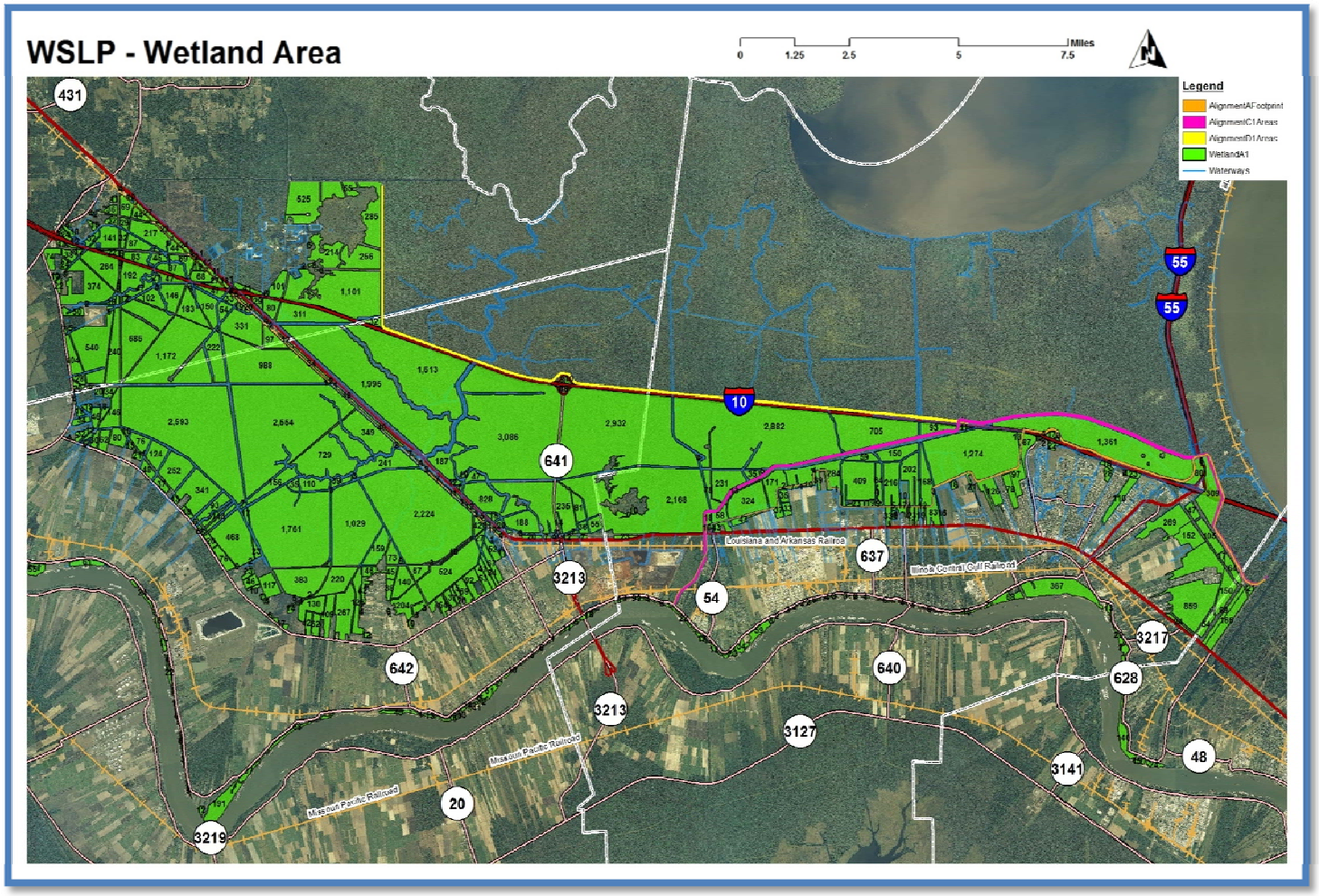


Figure 4-3: Wetland areas within each alternative in the final alternative array.

5.0 RECOMMENDED PLAN (PREVIOUSLY TENTATIVELY SELECTED PLAN) (*NEPA REQUIRED)

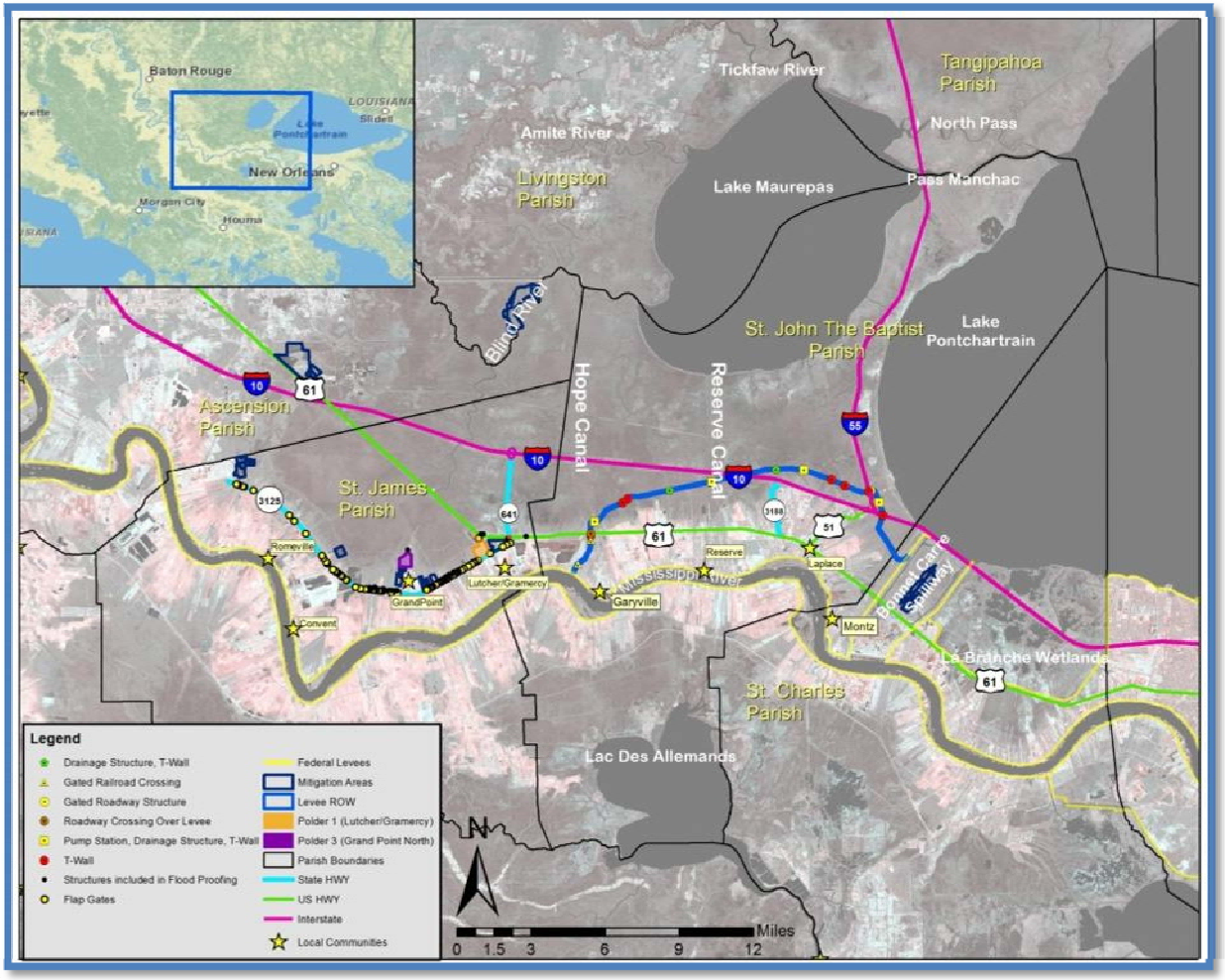


Figure 5-1: Overview of the entire risk reduction system.

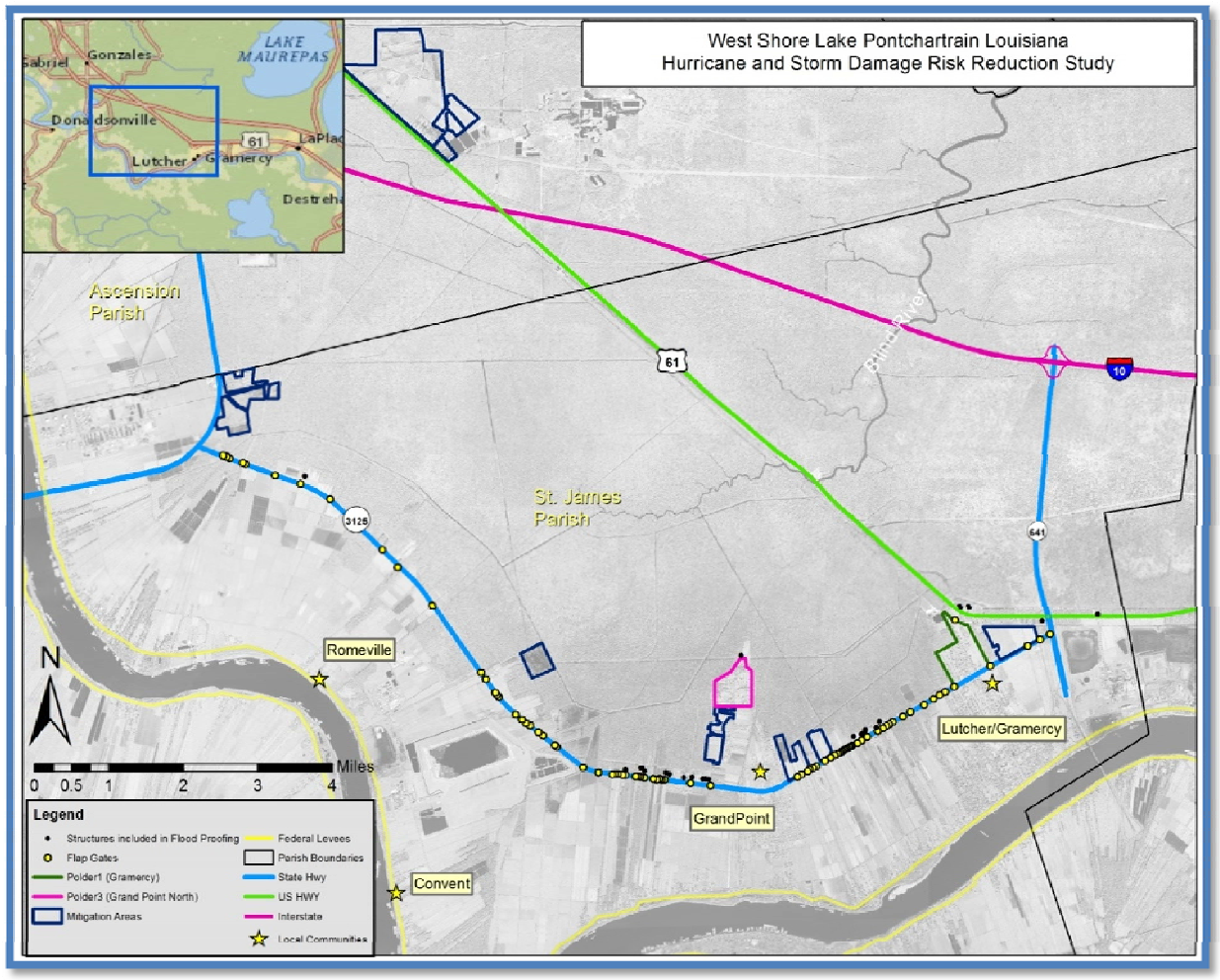


Figure 5-2: Overview of the Localized Storm Surge Risk Reduction System.

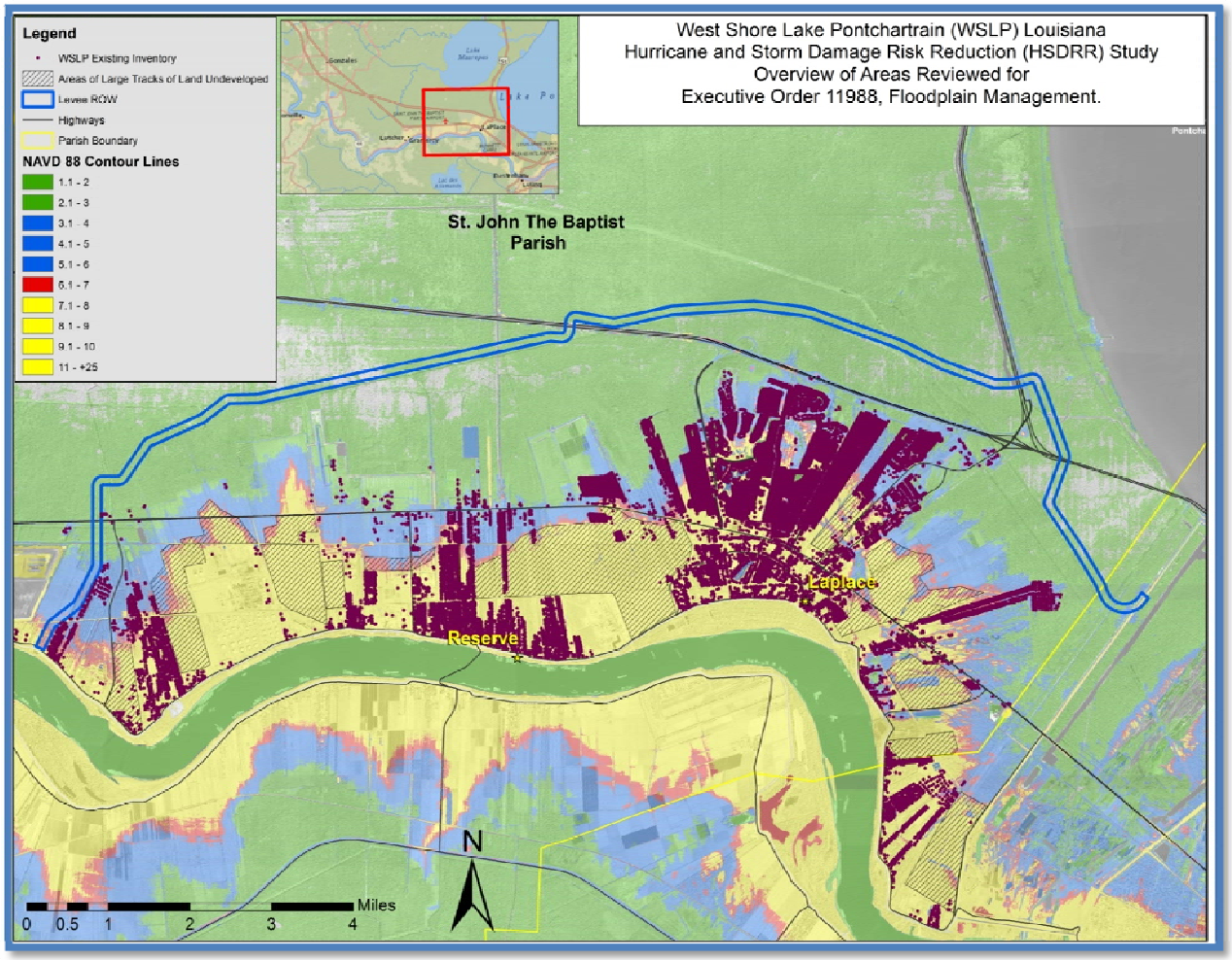


Figure 6-1: Overview of the areas reviewed for Executive Order 11988, Floodplain Management.

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED DRAFT FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
ENVIRONMENTAL APPENDIX

Annex A: Clean Water Act Section 401 Water Quality Certification
Clean Water Act Section 404(b)(1) Evaluation
Annex B: Louisiana Coastal Resources Program Consistency Determination
Annex C: Louisiana State Department of Wildlife and Fisheries Mitigation Letter
Annex D: National Marine Fisheries Service Scoping / Planning Aid Letter
Annex E: Natural Resources Conservation Service Prime and
Unique Farmlands Coordination
Annex F: State Historic Preservation Officer (SHPO) and
Tribal Coordination Letters
Annex G: U.S. Fish and Wildlife Service Final Coordination Act Report
Annex H: U.S. Fish and Wildlife Service Scoping / Planning Aid Letter
Annex I: Technical, Institutional and Public Significance of Relevant Resources
Annex J: Environmental Compliance Laws
Annex K: Mitigation Plan
Annex L: Adaptive Management and Monitoring Plan
Annex M: Water Quality Analysis
Annex N: Threaten and Endangered Species Coordination
Annex O: Air Quality
Annex P: USACE responses to Public Comments
Annex Q: Public Comments and Public Meeting Transcripts
Annex R: Wetland Value Assessment – Certification letter, Assumption and Spread Sheets
Annex S: Cost Effectiveness and Incremental Cost Analyses
Annex T: Hazardous, Toxic and Radioactive Waste

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex A

Clean Water Act Section 401 Water Quality Certification
Clean Water Act Section 404(b)(1) Evaluation

BOBBY JINDAL
GOVERNOR

PEGGY M. HATCH
SECRETARY

State of Louisiana

DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES

MAY 20 2014

Mr. Nathan Dayan
US Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

AI Number: 101235
Activity Number: CER 20140004

RE: Water Quality Certification WQC 140428-01
St. Charles, St. John the Baptist, St. James, Ascension, Livingston, Assumption and St. Tammany Parishes

Dear Mr. Dayan:

The Louisiana Department of Environmental Quality, Water Permits Division (LDEQ), has received notice of the application for a 401 Water Quality Certification to clear, grub, grade, excavate and place fill material for the Hurricane and Storm Damage Risk Reduction (HSDRR) Project located on the West Shore-Lake Pontchartrain in various parishes.

Based on the information provided in the application and the additional information received May 12, 2014, LDEQ has determined that the requirements for a Water Quality Certification have been met. LDEQ concludes that the excavation and placing of fill material will not violate water quality standards as provided for in LAC 33:IX.Chapter 11. Therefore, LDEQ hereby issues the US Army Corps of Engineers, New Orleans District Water Quality Certification, WQC 140428-01.

Should you have any questions concerning any part of this certification, please contact Elizabeth Johnson at (225) 219-3225 or by email at elizabeth.johnson@la.gov. To ensure all correspondence regarding this certification is properly filed into the Department's Electronic Document Management System, please reference your Agency Interest (AI) number 101235 on all future correspondence to this Department.

Sincerely,

Scott Guilliams
Administrator
Water Permits Division

c: IO-W

Addendum to
West shore Lake Pontchartrain Study
Section 401Water Quality Application

1. Following transmission of the Section 401 Water Quality application packet and publication of legal notices in the news papers modifications to the project occurred. These changes are briefly described below. Because the project modifications occurred after the application packet was finalized these changes are not reflected in the application packet. Please see chapter 5 of the Final Report for an updated project description of the recommended plan.

2. The Milton Island Swamp Restoration (SWMP5) mitigation component has been eliminated from the mitigation plan (table page 2, and description page 5 of "*WSLP Project Description*" attached to the application packet). See Annex K of this Appendix for the updated mitigation plan. The effect of this component is no longer part of this evaluation. There is no-longer impact in St. Tammany Parish. The quantity of borrow being used for mitigation item 21 in application is reduced to 2.8 M CY. The area of open water in item 22 is now 496.19 acres.

3. The Lutcher Polder Farmland Restoration (SWMP6) mitigation component has been increased in size. An additional 302 acres of farmland will be restored for a total of 348 acres (table page 2, and description page 5 of "*WSLP Project Description*" attached to the application packet). See Annex K of this Appendix for the updated mitigation plan. No fill will be placed in US waters as part of this project– no 404(b)(1) impacts. There are no new adjacent land owners (item 24), these land owners were previously identified due to being adjacent to the non-structural component of the study.

4. Throughout this Annex the term "nonstructural" is used to describe the following elements; berms, flap gates on the roadway, raising of homes and flood proofing of individual structures. In the main report these elements are identified as localized storm surge risk reduction measures in St. James Parish. There has been no change in the impact area of these element. The name has only changed for this portion of the final recommendation.

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

APRIL 28, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division South
New Orleans Environmental Branch

Mr. Scott Guilliams
LA DEQ
Office of Environmental Services
P.O. Box 4313
Baton Rouge, LA 70821-4313

Dear Mr. Guilliams:

The CEMVN is requesting WQC for the West Shore-Lake Pontchartrain, Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) Project. We have enclosed a WQ application which addresses the actions of the proposed HSDRR Project. The proposed action consists of various combinations of HSDRR and the associated mitigation plan (see attached).

The Draft EIS was released for public review on August 23, 2013. You will be notified when the Final EIS is released for state and agency review. The Final EIS will not be signed until all environmental review and compliance requirements have been completed. A copy of the signed EIS will be provided upon request.

Questions and/or concerns should be addressed to the attention of Mr. Nathan Dayan; U.S. Army Corps of Engineers; Regional Planning and Environmental Division South New Orleans Environmental Branch; Environmental Planning and Compliance Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267. Mr. Dayan can also be reached at Nathan.s.dayan@usace.army.mil or (504)862-2530.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, New Orleans Environmental Branch

Enclosures

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

(33 CFR 325)

OMB APPROVAL NO. 0710-003
Expires October 1996

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in or affecting, navigable waters of the United States, the discharge of dredged of fill material in waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application or a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	*2. FIELD OFFICE CODE*	*3. DATE RECEIVED*	*4. DATE APPLICATION COMPLETED*

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME US Army Corps of Engineers, New Orleans District	*8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required)* Same as Applicant
6. APPLICANT'S ADDRESS Regional Division South, Environmental Planning Branch CEMVN-PDN-CEP P.O. Box 60267 New Orleans, LA 70160-0267 ATTN:	***9. AGENT'S ADDRESS*** Same as Applicant
7. APPLICANT'S PHONE NOS. W/AREA CODE	*10. AGENT'S PHONE NOS. W/AREA CODE*
a. Residence ***b. Business*** (504) 862-2530	*a. Residence* *b. Business* Same as Applicant

11. STATEMENT OF AUTHORIZATION

Joan M Exnicios — April 25, 2014

APPLICANT'S SIGNATURE *DATE*

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
West Shore-Lake Pontchartrain,Louisiana
Hurricane and Storm Damage Risk Reduction (HSDRR) Project

13. NAME OF WATERBODY, IF KNOWN (if applicable) Lake Pontchartrain, Bonnet Carre spillway and some unnamed canals	*14. PROJECT STREET ADDRESS (if applicable)* *NA*
15. LOCATION OF PROJECT *St.Charles, St. John the Baptist, St. James, Ascension, Livingston Assumption and St. Tammany* Louisiana *COUNTY* *STATE*	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN, (see instructions)
The area is bounded on the southeast by the Bonnet Carre' Spillway, on the northeast by Milton Island, on the northwest by the Amite River diversion channel, on the west by the Ascension/St. James Parish line and on the south by the Mississippi River Levee.

17. DIRECTIONS TO THE SITE
Please see attachedproject description withmap

18. Nature of Activity (Description of project, include all features.)
Please See attachedProject Description

19. Project Purpose (Describe the reason or purpose of the project, (see instruction.)
The purpose of the project is to provide hurricane and storm damage risk reduction tothe communities of Montz, Laplace, Reserve Garyville and St. James Parish
The project also consists of a mitigation plan to mitigate impacts to forested wetlands during construction of the system

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge
To construct the HSDRR levee and berms
To bring existing grade up to bottomland hardwood and swamp elevatiofor mitigation

21. Type(s) of Material BeingDischarged and the Amount of Each Type in Cubic Years.
Levee -4.7 Million cubic yard (CY) compacted 1.3 M CY uncompacted, and 85,319 CY limestone
Structures -12,533 CY concrete
Berms -0.8 M cy compacted fill
Mitigation 4.9 M CY borrow

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)
941.19 acres of open water, 1,187 acres forested wetlands

23. Is Any Portion of the Work Already Complete? Yes _____ No _X_ IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered herepse attach a supplemental list.
See attached

25. List of Other Certifications or Approvals/Denials Received from other Federa State or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL	IDENTIFICATION NO.	DATE APPLIED	DATE APPROVED	DATE DENIED
DNR	Coastal Zone Consistency		27 March 14	ongoing	
USACE	404(b)(1)		31 March 14	ongoing	
USFWS	Endangered Species Act		07 April 14	ongoing	
NMFS	Endangered Species Act	SER-2014-13887	10 April14	ongoing	
SHPO	Section 106			ongoing	

To the best of my knowledge the proposed activity described in my permit application complies with and will be conducted in a manner that is consistent with the LA Coastal management Program.
*Would include but is not restricted to zoning, building and flood plain permits.

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Joan M Exnicios 4-25-14
SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

West Shore-Lake Pontchartrain, Louisiana
Hurricane and Storm Damage Risk Reduction (HSDRR) Project

Project Description

The final selected risk reduction system for the WSLP study includes the construction of an 18.27-mile (96,481 ft) levee system around the communities of Montz, Laplace, Reserve and Garyville. The levee system would consist of earthen levees, floodwalls (T-Walls), floodgates, drainage canals, flood side ditch for hydraulic connectivity for wetlands north and south of the recommended plan, drainage structures and pump stations located along the alignment. The final selected risk reduction system also includes the construction of nonstructural components in St. James Parish consisting of berms, culverts with flap gates and raising of structures. A mitigation plan has been developed to address the direct impacts to approximately 1,236 acres of forested wetlands and the associated indirect impacts.

Structural

The construction of the levee system would begin at the upper guide levee of the Bonnet Carre Spillway, north of an underground utility pipeline right of way and US-61. The levee would head northwest paralleling the pipeline right of way and pass under I-10. Past I-10 the levee would enclose the I-10 and I-55 interchange and cross US-51. It would then track north of I-10 and a pipeline transmission corridor. Past the Belle Terre/I-10 exit, the levee would pass back under I-10 and parallel the pipeline corridor through wetlands until it crosses Hope Canal. The levee would then turn south; cross the pipeline transmission corridor and then extend to the Mississippi River Levee System (MRL).

Non-structural

The non-structural components would consist of three Polders, flood control under LA 3125 and raising of structures. Polder 1 would consist of a 10,086 lf nonstructural berm In the Gramercy area, north of Hwy 3125. The berm would also include two floodgates to allow existing drainage to flow through the berm when not under surge events. A temporary system pump, approximately 217 cfs, would be included as part of the nonstructural berm system to remove any rainfall during the surge event.

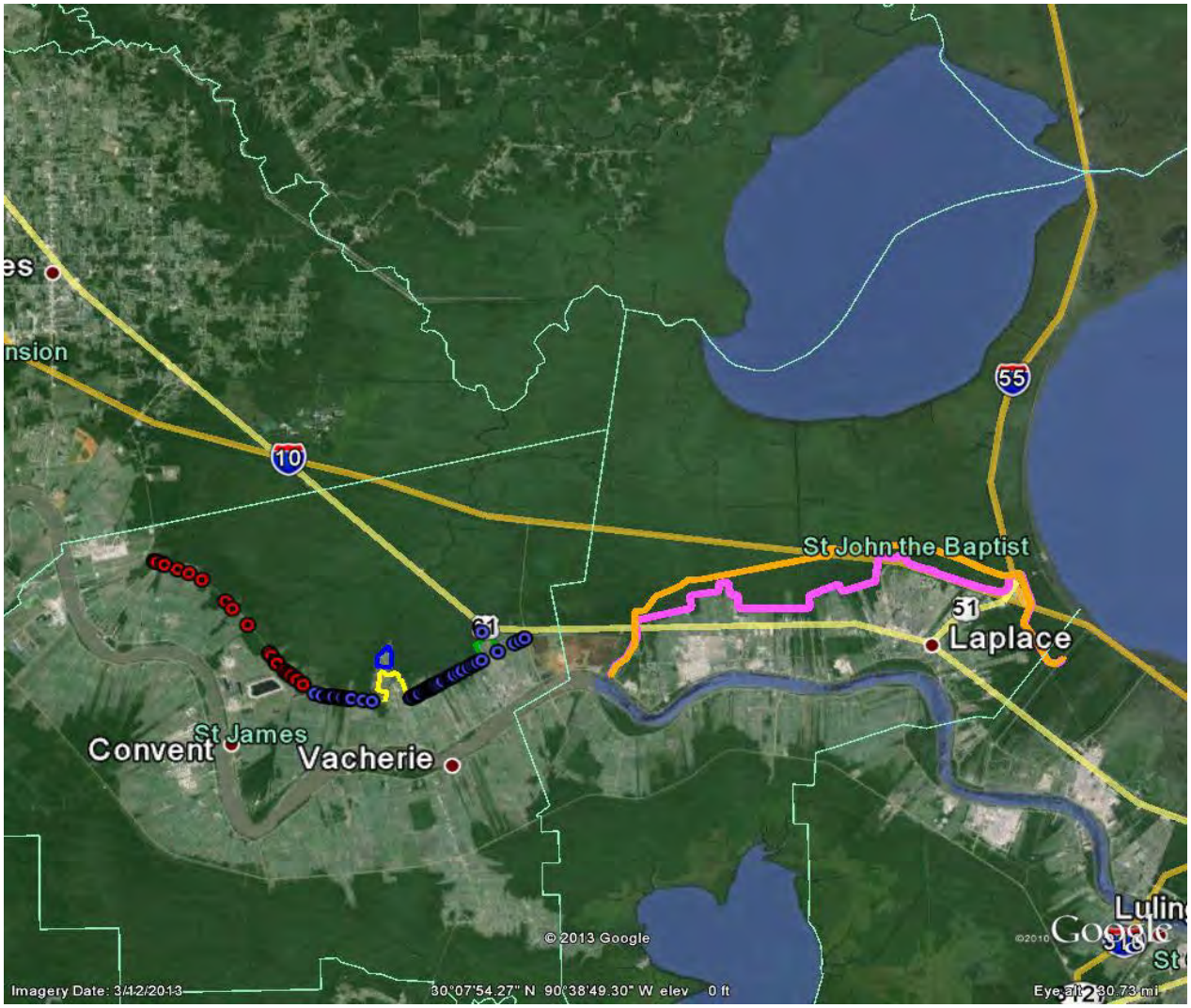
Polder 2, called~~,~~ Grand Point South would tie into HWY 3125. The berm would be 14,488 lf. The berm would also include one floodgate to allow existing drainage to flow through the berm when not under surge events. A temporary system pump, approximately 382 cfs, would be included as part of the nonstructural berm system to remove any rainfall during the surge event.

Polder 3 consists of a 10,314 lf complete ring berm around the structures in the northern portion of Grand Point. A temporary system pump, approximately 140 cfs, would be included as part of the nonstructural berm system to remove any rainfall during the surge event.

The flood control under LA 3125 would consitst of 145 flap gate culvert closures, two flood gates and two small berms. The total length of these berms are approximately 645 lf.

33 structures with a first floor elevation less than the 6.5 ft NAVD 88 would be outside of the previously discussed non-structural features. These 33 structures would be raised to the stage associated with the 2070 100-year event.

Structural and Non-structural Project Features



Mitigation Plan

Proposed Mitigation Components	Acres
Bonnet Carre Bottomland Hardwood Restoration	156
Swamp Mitigation Bank Credit Purchase	n/a
Blind River Swamp Restoration	1,040
Bonnet Carre Swamp Restoration	310
Maurepas Crawfish Ponds Restoration	1,161
Milton Island Swamp Restoration	445
Lutcher Polder Farmlands Swamp Restoration	46
Total	3,158

Bonnet Carre Bottomland Hardwood Restoration (Figure K-1)

- Clear and grub woody vegetation within the mitigation sites before fill placement. This includes mechanized removal of invasive and nuisance plants. Degrade certain existing earthen mounds and ridges within each site to the final target grade elevation. Perimeter ridges at each site will be left in place at this stage to serve as containment berms.

- Eradicate invasive/nuisance plant species within the sites through groundbased application of appropriate herbicides to the target species, prior to fill placement. Follow-up eradication before initial planting of native species within these features, as necessary.

- Placement of fill within the sites as necessary to attain the desired final target grade elevation of approximately 1.5 feet NAVD88. The fill material would be dredged from within the Project right of way and hauled in trucks to the mitigation site.

- Final grading within the mitigation features after the fill deposited in these features has settled to the desired final target elevation, prior to initial planting of the features. This grading will be performed to remove any earthen ridges that remain projecting above the target grade elevation, thereby creating a relatively level surface.

- Plant native BLH canopy and midstory species in the sites.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

- As necessary, follow-up eradication of invasive/nuisance plant species through ground-based application of appropriate herbicides. There will likely be multiple eradication events performed during various years after construction.

Swamp Mitigation Bank Credit Purchase

Before the first levee construction contract is advertised, available mitigation banks and credits will be assessed to compensate for a portion of swamp impacts. The amount of credits purchased may be more or less than currently identified in Table K-2. If more credits are available then more may be purchased. If fewer credits are available then additional plans will be developed to construct mitigation projects. Specific monitoring of mitigation success criteria following acquisition of bank credits will be conducted in accordance with the terms of the applicable Mitigation Banking Instrument.

Blind River Swamp Restoration (Figure K-2)

- Verify that the Livingston Parish CIAP project was built, and that those hydraulic modifications when combined with this planting plan will produce the proposed AAHUs. If this is not verified then the details of the mitigation measure will be revised to accomplish the required mitigation.

- Plant native swamp canopy and midstory species on 1,040 acres.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

Bonnet Carre Swamp Restoration (Figure K-1)

- Clear and grub woody vegetation within the sites before fill placement. This will include mechanized removal of invasive and nuisance plant species. Degrade certain existing earthen mounds and ridges within each site to the final target grade elevation. Perimeter ridges at each site will be left in place at this stage to serve as containment berms.

- Eradicate invasive/nuisance plants within the sites through groundbased application of appropriate herbicides to the target species, prior to fill placement. Follow-up eradication before the initial planting of native swamp species within these features, as necessary.

- Place fill in the mitigation sites to a final target grade elevation of approximately 0.5 feet NAVD88. Use fill material obtained from the Project levee right of way

- Final grading within the sites after the fill deposited in these features has settled to the desired final target elevation, prior to initial planting of the features. This grading will be performed to remove any earthen ridges that remain projecting above the target grade elevation, thereby creating a relatively level surface in the mitigation features.

- Follow-up eradication before the initial planting of native swamp species within these features, as needed. There will likely be multiple invasive/nuisance plant species eradication events during various years after the initial planting event. These may take place even beyond the attainment of the initial success criteria.

- Plant native swamp canopy and midstory species in the sites after final grading.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

- As necessary, follow-up eradication of invasive/nuisance plant species through ground-based application of appropriate herbicides. There will likely be multiple eradication events performed during various years after construction.

<u>Maurepas Crawfish Ponds Restoration (Figure K-3)</u>

- Clear and grub woody vegetation within the sites before grading. This will include mechanized removal of invasive and nuisance plant species.

- Degrade existing earthen mounds and levees within each site to a final target elevation approximately 0.5 feet NAVD88. Grading will remove former water management levees that were used to manage the crawfish ponds. Removal of these levees is intended to create a uniform elevation and to enable open exchange of water with adjacent swamps.

- Eradicate invasive/nuisance plants within the sites through groundbased application of appropriate herbicides to the target species. Follow-up eradication before the initial planting of native swamp species as necessary.

- Plant 1,161 acres with native swamp canopy and midstory species after grading.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

- As necessary, follow-up eradication of invasive/nuisance plant species through ground-based application of appropriate herbicides. There will likely be multiple eradication events performed during various years after construction.

Milton Island Swamp Restoration (Figure K-4)

- Construct containment dikes around the restoration site.

- Dredge material from Lake Pontchartrain and pump it to the restoration site. Place fill in the mitigation sites to a final target grade elevation of approximately 0.5 feet NAVD88.

- Eradicate any invasive/nuisance plants within the site through groundbased application of appropriate herbicides to the target species.

- Plant 445 acres of native swamp canopy and midstory species.
- Install nutria guards on all planted trees to protect against herbivore tree loss.

Lutcher Polder Farmlands Swamp Restoration (Figure K-5)

- Clear and grub woody vegetation within the sites before grading. This will include mechanized removal of invasive and nuisance plant species.

- Mechanically grade sites to a final target elevation approximately 0.5 feet NAVD88.

- Degrade existing earthen mounds and levees within each site to a final target elevation approximately 0.5 feet NAVD88. Grading should remove former water management levees that were used in the crawfish ponds. Removal of these levees is intended to create uniform elevation and to enable open exchange of water with adjacent swamps.

- Eradicate invasive/nuisance plants within the sites through groundbased application of appropriate herbicides to the target species. Follow-up eradication before the initial planting of native swamp species as necessary.

- Plant 46 acres with native swamp canopy and midstory species.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

- As necessary, follow-up eradication of invasive/nuisance plant species through ground-based application of appropriate herbicides. There will likely be multiple eradication events performed during various years after construction.

Mitigation Project Location and Features

Figure K-1: Bonnet Carre Spillway Bottomland Hardwood Restoration and Bonnet Carre Spillway Swamp Restoration

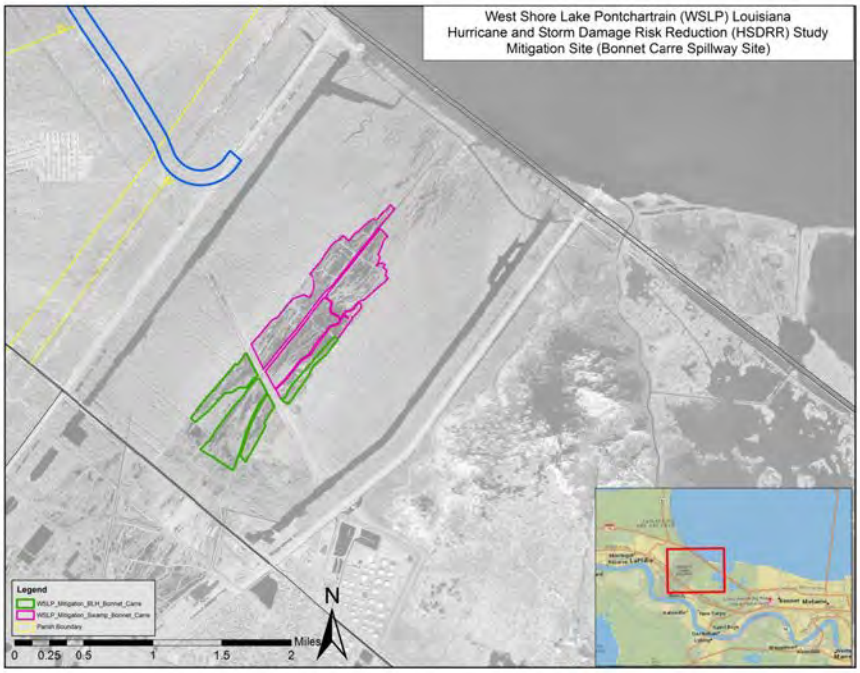


Figure K-2: Blind River Swamp Restoration

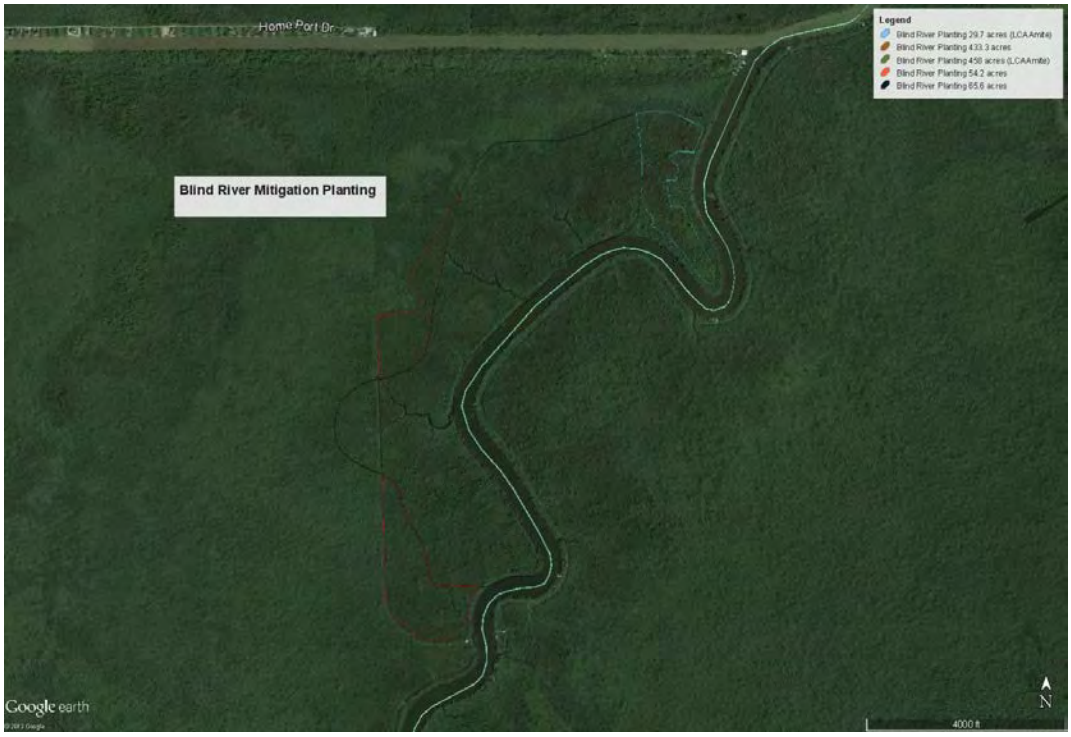


Figure K-3: Maurepas Crawfish Ponds Swamp Restoration

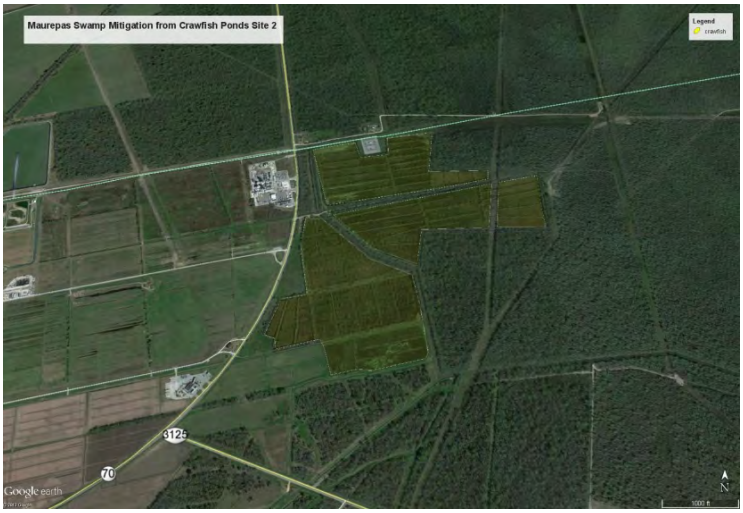


Figure K-4: Milton Island Swamp Restoration

Figure K-5: Lutcher Polder Farmland Swamp Mitigation

Addendum to
West shore Lake Pontchartrain Study
Section 404(b)(1) Evaluation Report

1. Following circulation of public notice for the Section 404(b)(1) Evaluation Report, modifications to the project occurred. These changes are briefly described below. Because the project modifications occurred after the Evaluation Report was finalized these changes are not reflected in the Evaluation Report. Please see chapter 5 of the Final Report for an updated project description of the recommended plan.

2. The Milton Island Swamp Restoration (SWMP5) mitigation component has been eliminated from the mitigation plan. See Annex K of this Appendix for the updated mitigation plan. The effect of the SWMP5 component is no longer part of the 404(b)(1) evaluation and therefore there are no-longer impacts in St. Tammany Parish or near the community of Madisonville.

3. The Lutcher Polder Farmland Restoration (SWMP6) mitigation component has been increased in size. An additional 302 acres of farmland will be restored for a total of 348 acres (Table 1 and page 18 of this evaluation). See Annex K of this Appendix for the updated mitigation plan. No fill will be placed in US waters as part of this expanded mitigation component and as such, there will be no related 404(b)(1) impacts.

4. The 131 AAHUs that were to be mitigated at SWMP5 will now be mitigated at the expanded SWMP6 (Table 1 of this evaluation).

Appendix A
Annex A2

SECTION 404(b)(1) EVALUATION REPORT

West Shore Lake Pontchartrain Study

St. Charles, St. John the Baptist, and St. James Parishes, Louisiana

Throughout this Annex the term "nonstructural" is used to describe the following elements; berms, flap gates on the roadway, raising of homes and flood proofing of individual structures. In the main report these elements are identified as localized storm surge risk reduction measures in St. James Parish. There has been no change in the impact area of these element. The name has only changed for this portion of the final recommendation.

Section 404(b)(1) Evaluation
West Shore Lake Pontchartrain Study
St. Charles, St. John the Baptist, and St. James Parishes, Louisiana

I. Project Description

a. Location. *Levee/Nonstructual:* The 184,351-acre area study is located in southeast Louisiana between the Mississippi River and Lakes Maurepas and Pontchartrain. The towns of Montz, LaPlace, Reserve, Garyville, Gramercy, Lutcher, Paulina, Hester, and Convent are area communities (figure 1and 2).

Mitigation: The mitigation areas are located in the Bonnet Carré Spillway in St. Charles Parish (figure 3); on converted farmland adjacent to the Grand Point south polder (figure 4) in converted crawfish ponds near the junction of Hwy 3125 and Hwy 3124 (figure 7) and Hwy 3125 and Hwy 70 (figure 6) in St James Parish, in converted crawfish ponds near Sorrento (Figure 5) in Ascension Parish, along Blind River in Livingston Parish (figure 8) and at Milton Island (figure 9) in St Tammany Parish. The towns of Norco, Montz, Lutcher, Paulina, Hester, Convent, Sorrento, Burnside, Madisonville, are area communities.

b. General Description. The final selected risk reduction system for the West Shore Lake Pontchartrain (WSLP) study includes the construction of an 18.27-mile (96,481-foot) long levee system. The final selected risk reduction system also includes the construction of nonstructural components in St. James Parish. An overview of the entire risk reduction system and the St. James Parish nonstructural features are shown on figure 1.

Due to the fact that the recommendation only addresses hurricane and storm surge damages, the system would not close more often due to higher day-to-day sea level rise impacts. Any operational changes outside of the original project purpose; the reduction of damages caused by wind-generated and tide-generated waves and currents, would be considered a separate project purpose and authorization, and would require a new NEPA documentation and/or a permit approval for this operation change.

Levee System:
The levee system would begin at the upper guide levee of the Bonnet Carré Spillway, north of an underground utility pipeline right of way and US-61. The levee would head northwest paralleling the pipeline right of way and pass under I-10. Past I-10 the levee would enclose the I-10 and I-55 interchange and cross US-51. It would then track north of I-10 and a pipeline transmission corridor. Past the Belle Terre/I-10 exit, the levee would pass back under I-10 and parallel the pipeline corridor through wetlands until it crosses Hope Canal. The levee would then turn south; cross the pipeline transmission corridor and then extend to the Mississippi River Levee System (MRL)

The construction of the levee system would be based on a 1% probability storm level of risk reduction and a 2020 intermediate sea level rise condition. In order to maintain the 1% probability storm level of risk reduction system over the life of the federal project (50 yrs) the levee system would include future levee lifts based on the 2070 intermediate sea level rise conditions. For example, at the starting point of the upper guide levee of the Bonnet Carré Spillway the levee would be constructed to a top of levee elevation of 15 ft NAVD 88 in 2020. In the future, the levee at this point would be lifted to a final elevation of 19.5 ft NAVD 88 based on the 2070 intermediate sea level rise conditions. This is the highest elevation point of the

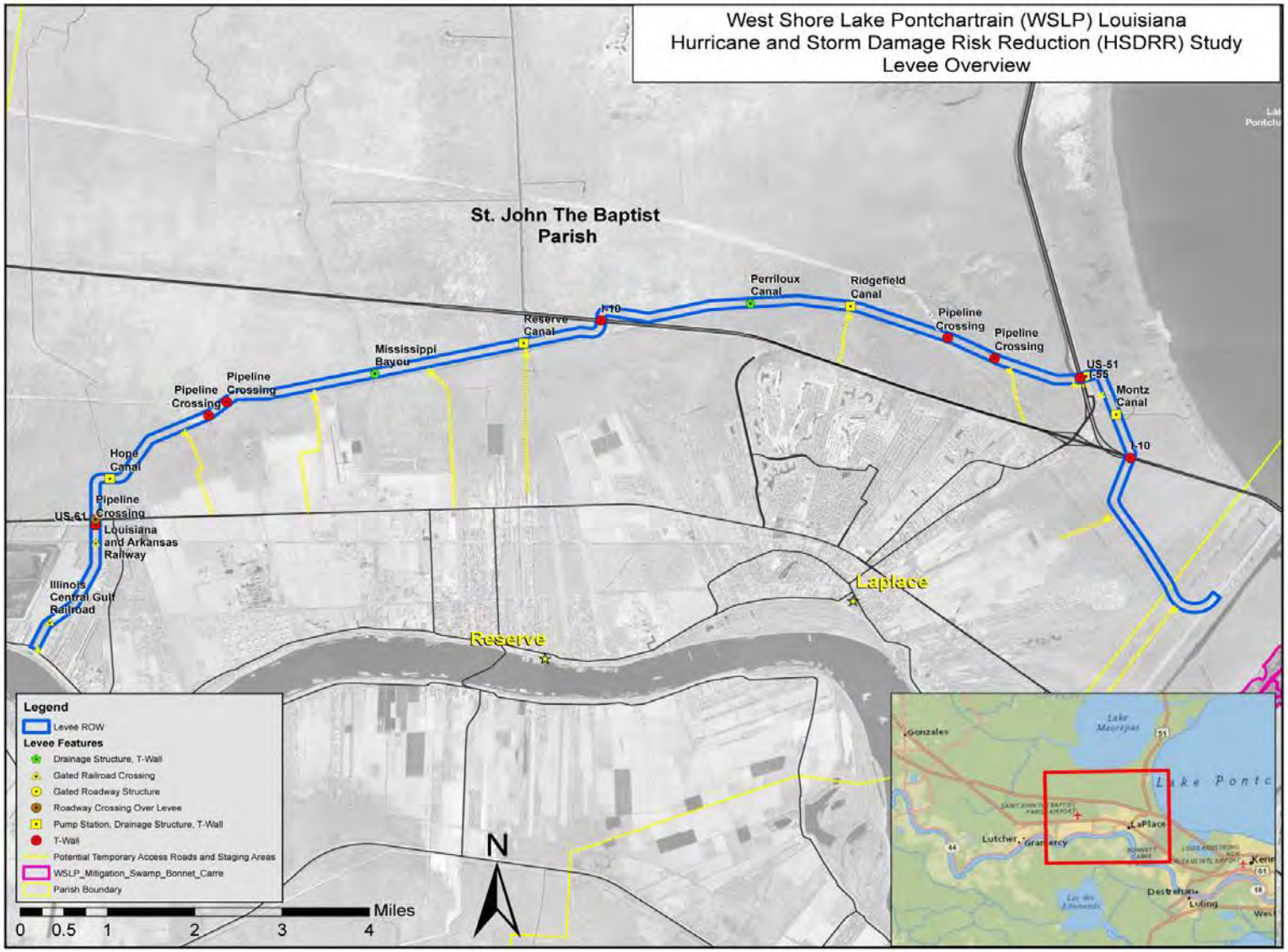


Figure 1: Project Map

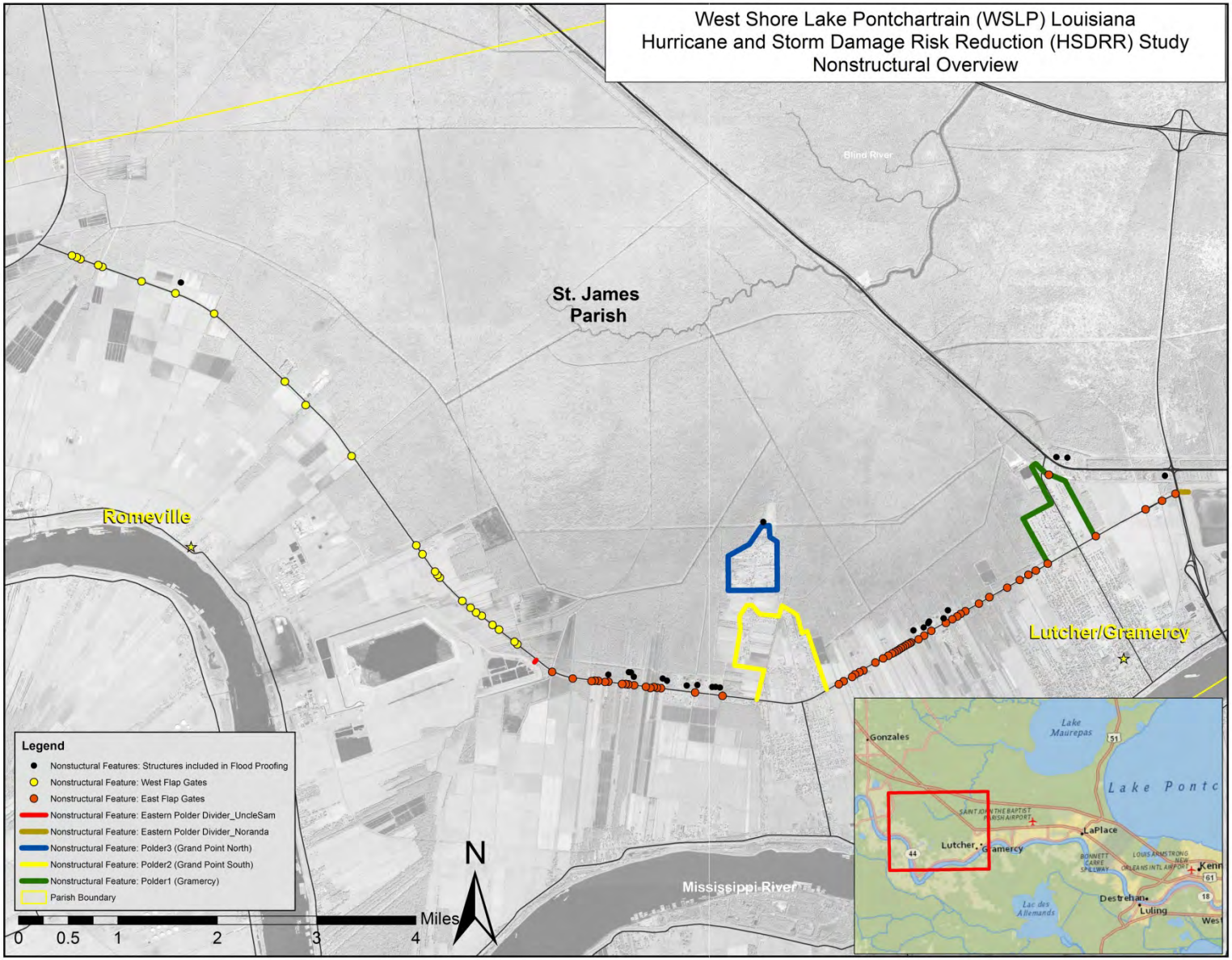


Figure 2: Nonstructual Features Project Map

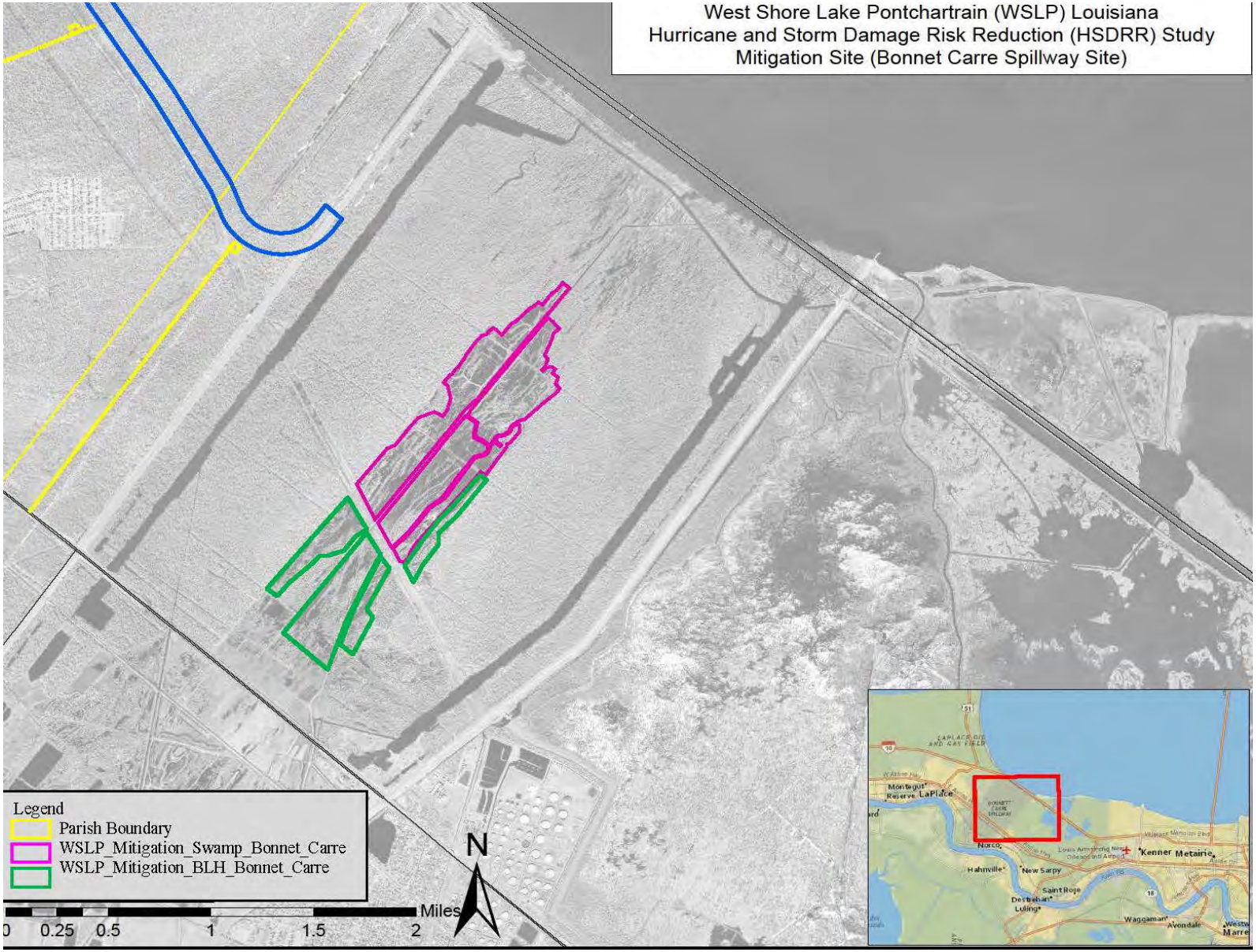


Figure 3: Bonnet Carré Spillway Mitigation (BLH1 and SWMP3)

Figure 4: Lutcher Polder Farmland Mitigation (SWMP6) – *no 404(b)(1) impacts*

Figure 5: Maurepas Swamp Crawfish Pond Mitigation Site 1 (SWMP4 1 of 3)

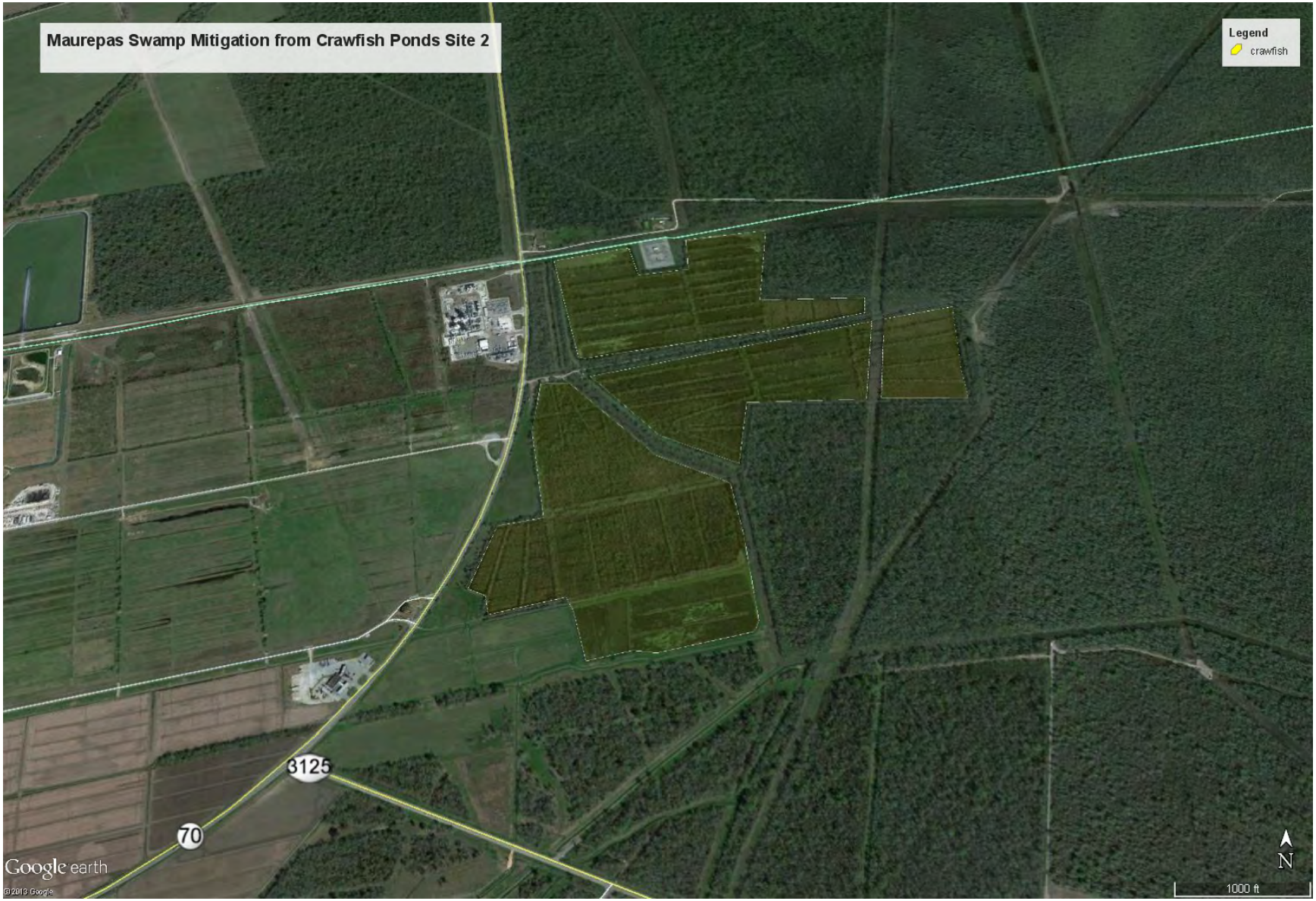


Figure 6: Maurepas Swamp Crawfish Pond Mitigation Site 2 (SWMP4 2 of 3)

Figure 7: Maurepas Swamp Crawfish Pond Mitigation Site 3(SWMP4 3 of 3)

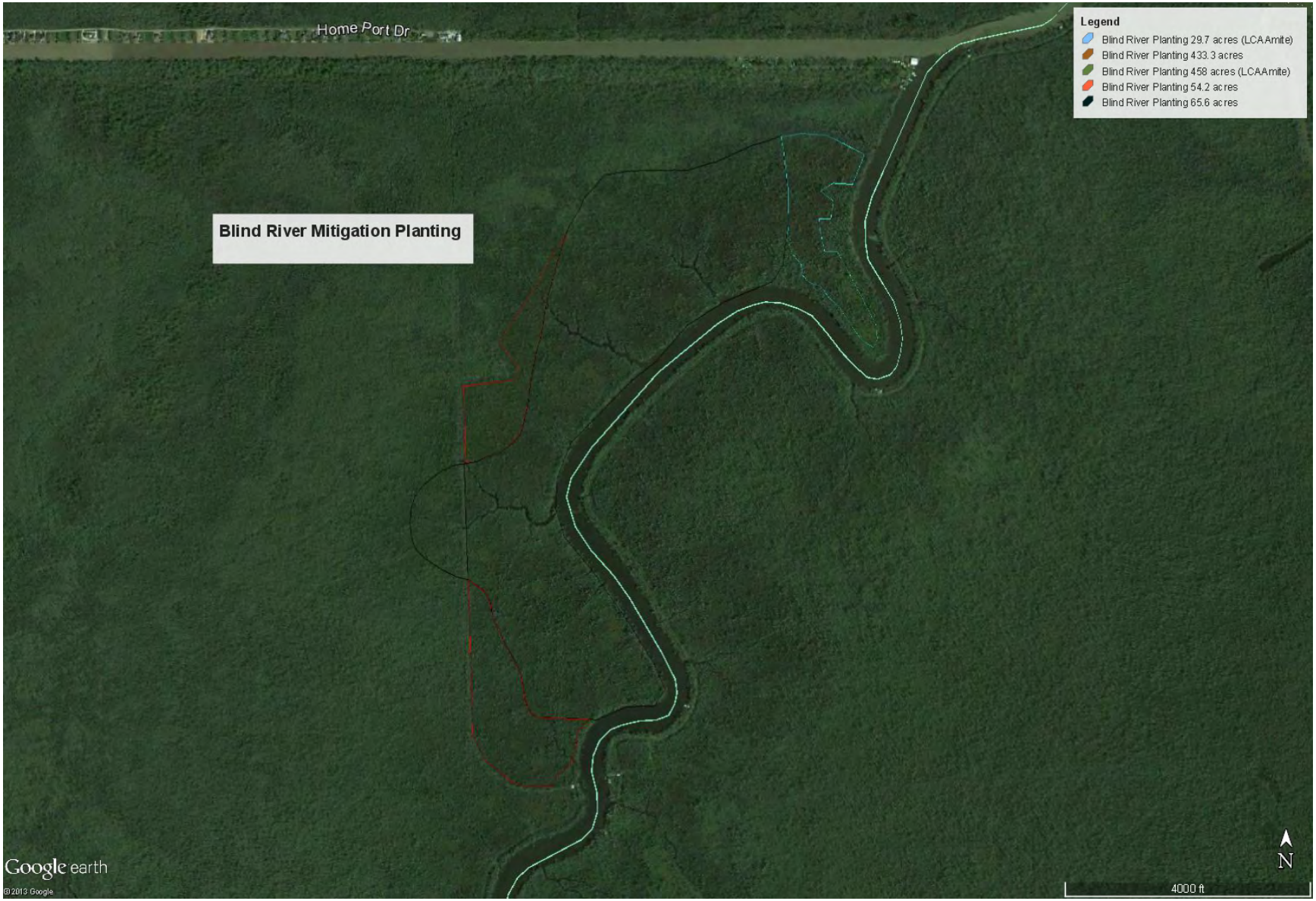


Figure 8: Blind River Mitigation (SWMP2) – *no 404(b)(1) impacts*

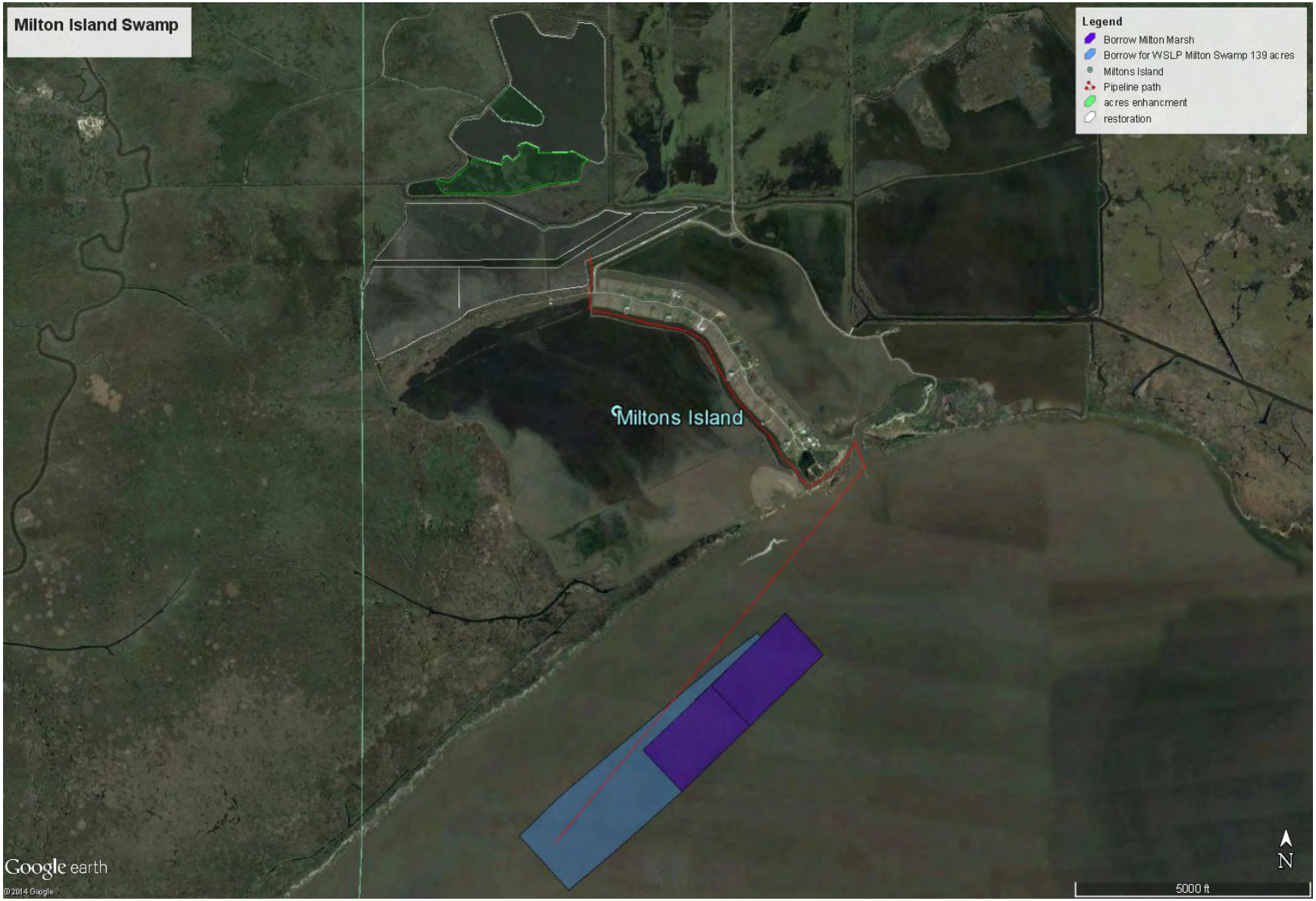


Figure 9: Milton Island Mitigation (SWMP5)

constructed levee system. The levee would start at this height and taper down to a final top levee elevation of 8.5 ft NAVD 88 near the MRL. The final 2070 top levee elevation near the MRL would be 16 ft NAVD 88.

The system would consist of earthen levees, floodwalls (T-Walls), floodgates, drainage canals, and a flood-side ditch for hydraulic connectivity for wetlands north and south of the system, drainage structures and pump stations along the alignment (Figure 1). Structures through the levee would be built to the 2070 intermediate sea level rise condition, to prevent costly future retrofits required for changing sea levels.

Starting at the upper guide levee of the Bonnet Carré Spillway and heading west along levee the project would construct a 646 lf T-Wall to pass under the existing I-10 overpass. Past this point, an 1100 cfs pump station with three 68" outfalls would be built at Montz Canal, which is very near the I-55 northbound entrance ramp. The pump station, when the system is closed, would mainly remove rainwater flows from the Woodland, the River Forest, and the Prescott Canals. A 267 lf T-Wall and with two 6' x 18' x 27' gated drainage structures would also be constructed at this location. This location and all locations with pump stations or drainage structures would be connected to a flood side ditch and a protected side canal that would parallel the entire levee length. The canals would be used to maintain the existing connection between swamps inside and the swamps outside the levee system. The protected side canal would also serve as a redundancy connection if one of the pump stations failed during an event.

Past the Montz Canal, at the location of US-51, a 188 lf gated structure would be placed through the levee. Directly west of US-51, a 247 lf T-Wall would cross under I-55. The levee would continue to the west until the levee intercepts the first pipeline crossings near Vicknair Canal. Two sections of T-Walls would be used for these pipeline crossing, a 550 lf T-Wall, and a 623 lf T-Wall. Half of the 35 required pipeline relocations would be at these two locations. It is expected that all of the pipeline relocation would be compensable, but the relocations would take place in the proposed levee right of way (ROW) or existing pipeline ROW.

Continuing west, the levee would then cross Ridgefield Canal. Ridgefield Canal is located between the I-10 LADOT weight station and the I-10/LA 3188 exit. A 200 cfs pump station with three 30" outfalls would be built at Ridgefield Canal. The pump station, when the system is closed, would mainly remove rainfall flows from Laplace Plantation, Perriloux, Ridgefield, Tebo and Vicknair canals. A 244 lf T-Wall and with two 6' x 18' x 267' gated drainage structures would also be constructed at this location.

West of the Ridgefield Canal, a 100 lf floodgate would be constructed at the location of the Perriloux Canal to allow rainfall flows to flow through the levee when the system is not closed.

West of the I-10/LA 3188 exit, a 247 lf T-Wall would be constructed to cross back under I-10. The levee would continue to parallel the pipeline corridor through wetlands until it reaches Reserve canal. A 400 cfs pump station with three 48" outfalls would be built at this location. The structure at this location would also include two 6' x 20' x 25' drainage structure with a boat bay and 335 lf of T-Walls. Small boats would still be able to pass through the drainage structure when the system is open.

Continuing west, the levee would then cross Mississippi Bayou. A 6' x 10' x 25' drainage structure with a 267 lf T-Wall would be constructed at this location.

The levee would then continue west toward Hope Canal, until it reaches the next major set of pipeline crossings. All of the remaining major pipeline relocations would be at this location. Two sections of T-Walls would be used for these pipeline crossing, a 400 lf T-Wall, and a 300 lf T-Wall. As with the other pipelines, it is expected that the pipeline relocations would be compensable, but the relocations would take place in the proposed levee right of way (ROW) or existing pipeline ROW at this location.

The levee would then continue west until it reaches Hope Canal. A 450 cfs pump station with three 54" outfalls would be constructed at this location. Currently the design and cost includes a 6' x 20' x 25' drainage structure and a 247 lf T-Wall, but the Hope Canal location is also the same location of the State of Louisiana's proposed Mississippi Reintroduction into Maurepas Swamp diversion. The WSLP project has been coordinating activities between the project development teams, but for the purposes of the WSLP feasibility design, we do not consider the diversion project as a future landscape feature, since the State has not identified funding and has not submitted final permits to the USACE for construction of the project. The USACE would continue to monitor the status of the diversion project. The team expects that if the diversion project moves forward it would be constructed on the flood side of the levee and would parallel the levee from Hope Canal to the MRL.

When the levee turns south, past Hope Canal to tie into the MRL, the levee would cross US-61, a pipeline ROW, and two railroad tracks. US-61 would be raised to hump over the levee at the crossing point. The pipeline crossing would include a 301 lf T-Wall, while the two railroad crossings would include a 150 lf gate structure and a 50 lf gate structure.

In all, there would be a total of 5,001 lf of T-Walls, 4 pump stations with associated drainage structures, 2 drainage structures, one gated road crossing, and 2 gated railroad crossings.

4.69 miles of the upper guide levee of the Bonnet Carré Spillway from the spillway control structure to the WSLP tie-in point would be included in the WSLP levee system, but there would be no construction activities associated with this Bonnet Carré levee. Existing levee heights are high enough to prevent 1% probability storm surge from entering the WSLP system during storms. The construction of the WSLP tie-in point would be to set to elevation of 15 ft NAVD 88 while the current upper guide levee elevation is 15.5 ft NAVD 88. The upper guide levee heights in the future would be monitored to determine if sections of the Bonnet Carré Spillway levee would need future lifts to prevent overtopping of storm surges into the WSLP system.

All levee rights-of-way (figure 10) would have the following typical dimensions, starting on the flood side of the levee system. The 50 ft and 100 ft right of ways adjacent to the levee footprints would be used for future levee lifts. The levee would be lifted five times over the life of the project. The first two lifts would be used to obtain a 1% probability storm level of risk reduction system in 2020. Additional levee lifts to maintain a 1% probability storm level of risk reduction system would take place years 2030, 2045, and in 2060.

9,000,000 million cubic yards (cy) of compacted fill and un-compacted fill would be required to create and maintain the levee over the life of the project. A portion of the initial fill material if suitable would be obtained from the canals and ditch, approximately 1,678,000 cy. Borings indicate that the top 4 ft of the cross section of these features would not be suitable as levee fill material. The top 4 ft of material; approximately 1,685,000 cy, would used beneficially for the mitigation plan, or disposed appropriately by the contractor. The remaining fill for the levee, approximately 7,322,000 cy, would be obtained from the Bonnet Carré Spillway.

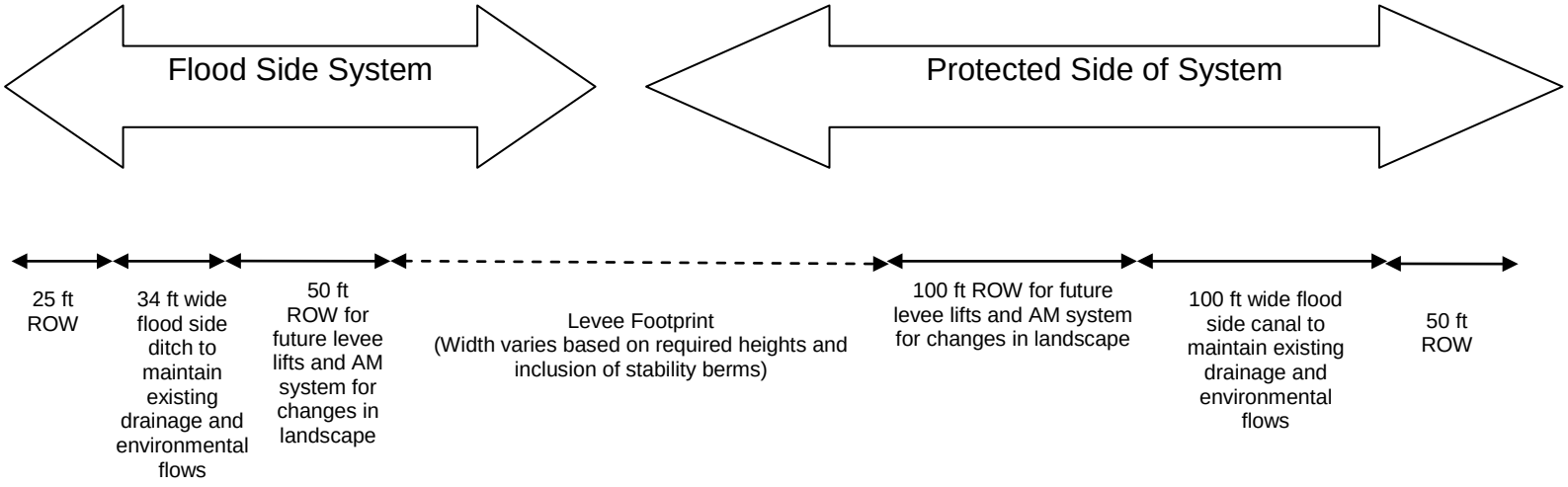


Figure 10: Typical Dimensions of Levee Right Of Way.

The total construction right-of-way of the levee system would be 1,237 acres. All of the impacts from the constructed features would be to either open water, swamp habitats or bottomland hardwoods (BLH) habitats. There would be a direct removal of approximately 15 acres of open water, 1,112 acres of swamp and 123 acres of BLH habitats. In addition to the direct removal of habitat with the constructed features, the project would enclose 8,432 acres of swamp and 89 acres of BLH.

Nonstructural System

Gramercy Area

In the Gramercy area, north of Hwy 3125, a 10,100 lf nonstructural berm would be built to provide risk reduction to 275 structures, herein referred to as "**Polder 1 (Gramercy Berm)**." The berm would be constructed to a +6.5' NAVD 88 elevation. The berm in 2020 would provide risk reduction above 1% the AEP storm stages. Storm stages St. James Parish are below +6.5' NAVD 88 elevation in 2020. As discussed in Chapter 3, in the future, the berm's effectiveness depends on the sea level rise and local improvements.

The berm would parallel both side sides of HWY 20, and parallel the railroad track along US-61 (Airline Highway). On the south, the berm would tie into Hwy 3125 to close off the system. Hwy 3125 is key feature for all of the nonstructural features. The entire roadway is above a 6.5 ' NAVD 88 elevation and will be used as a tie in point for all berms. The design of the berm is based on with a 4' wide crown and 3:1 side slopes. Using local LIDAR data it was assumed that the existing ground elevation under the berm would be at an elevation of approximately 4.3 ft NAVDD88. Using this assumption the proposed berm would have an average height of 2.2 ft with an average with of 18 ft, and require 237,000 cy of compacted fill for construction. The berm would also include two floodgates to allow existing drainage to flow through the berm when not under surge events. A temporary system pump, approximately 217 cfs, would be included as part of the nonstructural system to remove any rainfall during the surge event. The berm would be placed on opposite banks so that the areas enclosed by the polder would still be able to drain into the ditches.

In reviewing, the berm footprint there is a risk of affecting approximately 0.29 acres of forested wetlands. Attempts would be made to avoid these areas during construction. Due to the current uncertainty in avoiding these areas, we have included cost for mitigating for these forested wetlands in the total construction cost.

Grand Point Area

In the Grand Point area, north of Hwy 3125, the recommended plan includes two nonstructural berms, "**Polder2 (Grand Point South)**" and "**Polder3 (Grand Point North**)".

Polder2 (Grand Point South) would reduce risk for 190 structures. The berm would be 14,488 lf, and would include a 4' wide crown and 3:1 side slopes. Similar to the Gramercy berm, it would tie into HWY 3125 and be constructed to a 6.5' NAVD 88 elevation. Initial the berm in 2020 would provide risk reduction above 1% the AEP storm stages. Storm stages St. James Parish are below a 6.5' NAVD 88 elevation in 2020.

Using LIDAR data it was assumed that the existing ground elevation under the berm would be approximately 4.5 'NAVD 88. Using this assumption the proposed berm would have an average height of 2 ft with an average width of 16 ft, and require 273,900 cy of compacted fill for construction. The berm would also include one floodgates to allow existing drainage to flow through the berm when not under surge events. A temporary system pump, approximately 382

cfs, would be included as part of the nonstructural system to remove any rainfall during the surge event. The berm would be placed on opposite banks so that the areas enclosed by the polder would still be able to drain into the ditches. The berm would also be placed very near the edge of the property owners parcels where feasible. This would minimize the loss of use of any property.

Polder3 (Grand Point North) would provide risk reduction to 71 structures. The berm would be a complete ring around the structures in the northern portion of Grand Point, near the Grandpoint Boat Lunch. The berm would be 10,400 lf, and would include a 4' wide crown and 3:1 side slopes. The berm would be constructed to a 6.5 ' NAVD 88 elevation. Initial the berm in 2020 would provide risk reduction above 1% the AEP storm stages. Storm stages St. James Parish are below a 6.5‘ NAVD 88 elevation in 2020.

Using local LIDAR data it was assumed that the existing ground elevation under the berm would be approximately 4‘ NAVD 88. Using this assumption the proposed berm would have an average height of 2.5 ft with an average width of 20 ft, and require 286,800 cy of compacted fill for construction. The berm would also include one floodgates to allow existing drainage to flow through the berm when not under surge events. A temporary system pump, approximately 140 cfs, would be included as part of the nonstructural system to remove any rainfall during the surge event. The berm would be placed on opposite banks so that the areas enclosed by the polder would still be able to drain into the ditches. The berm would also be placed very near the edge of the property owners parcels where feasible. This would minimize the loss of use of any property.

In reviewing, the berm footprint there is a risk of affecting approximately 0.81 acres of forested wetlands. Attempts would be made to avoid these areas during construction. Due to the current uncertainty in avoiding these areas, we have included cost for mitigating for these forested wetlands in the total construction cost.

Flood Control Under (LA 3125)

In addition to the nonstructural berms north of Hwy 3125, the recommended plan is to use Hwy 3125 as nonstructural feature. The roadway elevation is above a 6.5 'NAVD 88 elevation and currently under a 2020 100 yr event, surges flow, in the opposite direction from natural drainage, through the culverts under the roadway. By closing off the culverts with one-way flap gates and a drainage canal with a floodgate under surge events, the plan would provide risk reduction to 19,500 acres and 4,295 structures south of Hwy 3125. Although there are a limited number structures that are impacted by a 1% AEP storm surge event, this closure would prevent a large portion of the parish’s critical sugarcane crops from flooding from storm surge. In addition, if the parish in the future makes improvements to Hwy 3125, any additional height added to the highway would add to the structures risk reduction level.

The recommended plan includes 145 flap gated closures, two floodgates and two small berms (Noranda and Uncle Sam). The Noranda berm ties the highway into high ground east of Gramercy. The Uncle Sam berm divides the developed area behind Hwy 3125 from an area that is primarily agricultural land. By dividing these two areas the local community can focus its reduction effort in the future. The area west of the Uncle Sam berm includes an area of 8,175 acres, but only includes one structure that is has a first floor elevation below the 1% the AEP storm stages. The total length of the berms is approximately 645 lf.

Due to the nature of the flooding south of Hwy 3125, it is assumed that the 19,500 acres would have ample storage capacity to hold any rainfall during the surge events. Even if some acres of

crops are flooded from rainfall it would be much less than if the surge was allowed to flow under Hwy 3125.

Remaining Structures in St. James Parish

The recommended plan addresses the flooding of structures located outside of the polders north of Hwy 3125. Eighty structures would be outside of the nonstructural berms. Only 23 of the 80 structures have a first floor elevation less than the 1% AEP storm stages in 2020. Based on this evaluation the recommended plan includes 14 residential structures would be raised to the stage associated with the 2070 1% (100-year) ACE event; 4 non-residential structures would be flood proofed to 3 feet above the ground elevation; and smaller nonstructural berms would be constructed for 5 light industrial/warehouse facilities.

Wetland Mitigation:

Seven mitigation plan components will provide the required compensation for habitat impacts. The first feature mitigates for project BLH impacts. Six other components collectively compensate for project swamp impacts. The components are as listed in the table 1 and described below:

Table 1: Mitigation Components

Mitigation Project ID	Proposed Components	Acres	Net Gain AAHU
BLH1	Bonnet Carré Bottomland Hardwood Restoration	156	99
SWMP1	Swamp Mitigation Bank Credit Purchase	n/a	72
SWMP2	Blind River Swamp Restoration	1,040	339
SWMP3	Bonnet Carré Swamp Restoration	310	121
SWMP4	Maurepas Crawfish Ponds Restoration	1,161	407
SWMP5	Milton Island Swamp Restoration	445	131
SWMP6	Lutcher Polder Farmlands Swamp Restoration	46	20
TOTAL		3,158	1,189

BONNET CARRÉ BOTTOMLAND HARDWOOD RESTORATION (BLH1): A mitigation site for bottomland hardwood habitat has been identified within the Bonnet Carré Spillway between Highway 61 and Interstate 10 (figure 3). The project would create 156 acres using dredged material and tree plantings. Creating bottomland hardwood forest would provide benefits to wildlife and fisheries.

Mitigation would consist of beneficially placing dredge material obtained from within the WSLP levee construction footprint. Material would be hauled by truck and placed in existing shallow open water areas in the spillway. Work would commence at the northern-most portion of the area and proceed towards the river until 156 acres is restored.

SWAMP MITIGATION BANK CREDITS (SWMP1): The feasibility study documented that sufficient mitigation bank credits exist in the Pontchartrain Basin to partially offset the impacts to swamp habitat. It is not known which banks would be available with sufficient credits when project implementation begins. It is assumed that credits would be available when the need arises. Some banks may not have enough credits remaining, some may be closed, and additional mitigation banks may be approved before the WSLP project begins. SWMP1 is not considered in this evaluation; any approved mitigation bank would have all required permits and evaluations needed.

BLIND RIVER SWAMP RESTORATION (SWMP2): A project site in Livingston Parish west of the Blind River has been identified to plant swamp vegetation. See figure 8 for a map of the area and mitigation details. No fill will be placed in US waters as part of this project – no 404(b)(1) impacts. Key parts of the restoration plan are:

- Plant native swamp canopy and midstory species on 1,040 acres.
- Install nutria guards on all planted trees to protect against herbivore tree loss.

BONNET CARRÉ SWAMP RESTORATION (SWMP3): A mitigation site for swamp habitat has been identified within the Bonnet Carré Spillway between Highway 61 and Interstate 10. The project would create 310 acres of swamp using beneficial placement of dredged material and tree plantings. Creating swamp would provide benefits to wildlife and fisheries. See figure 3 for a map of the area and details of the mitigation features. Dredged material would be hauled and placed in existing shallow open water areas in the spillway.

MAUREPAS CRAWFISH PONDS SWAMP RESTORATION (SWMP4): Mitigation sites for swamp habitat have been identified at former crawfish ponds in the upper Maurepas basin. The project would restore 1,161 acres of swamp through land grading and tree plantings. See figures 5, 6 and 7 for a map of the area and project details.

MILTON ISLAND SWAMP RESTORATION (SWMP5): A mitigation site for swamp habitat has been identified near Madisonville, Louisiana. The project at Milton Island would create 389 acres of swamp through dredged material placement and tree plantings. An additional 56 acres of swamp would be enhanced with dredged material and tree plantings. See figure 9 for a map of the area and details of the mitigation project and the location of the designated borrow source in Lake Pontchartrain adjacent to borrow being cleared for the LPV HSDRR marsh mitigation project at Milton Island.

LUTCHER POLDER FARMLAND SWAMP RESTORATION (SWMP6): A mitigation site for swamp habitat has been identified near Lutcher. The project would restore 46 acres of swamp through land grading and tree plantings. Creating swamp would provide benefits to wildlife and fisheries. See figure 4 for a map of the area and project details. No fill will be placed in US waters as part of this project– no 404(b)(1) impacts.

c. Authority and Purpose.

Two Congressional resolutions authorize this study. The first was adopted on July 29, 1971 by the U.S. House of Representatives Committee on Public Works. The second was adopted by the U.S. Senate Committee on Public Works on September 20, 1974.

d. General Description of Dredged or Fill Material

(1) General Characteristics of Material. Suitable clay that meets the USACE's specifications will be used for levee construction. Overburden material such as topsoil and sand will be used for the wetland mitigation areas.

(2) Quantity of Material. The levee will require 9,000,000 cubic yards of clay, 80,000 cubic yards of limestone aggregate, and 3,400,000 yards of geotextile fabric. The nonstructural system will require 797,700 cubic yards of clay. The mitigation will require 1.4 M cubic yards of material for the combined Bonnet Carré site and 2.1 M cubic yards for the Milton Site. An undetermined amount will be moved in the Maurepas Crawfish ponds.

(3) Source of Material. Clay will come from the drainage canals adjacent to the levee project and the Bonnet Carré Spillway Borrow Area for the levee and berm construction. Material for the mitigation site at Bonnet Carré will come from drainage canals adjacent to and under the levee project. The source of the material for the Milton Island mitigation measure will be a borrow area in Lake Pontchartrain and adjacent to the site identified for the LPV HSDRR marsh mitigation at Milton Island. Material in the crawfish ponds will be reworked for onsite grading to required elevations.

e. Description of the Proposed Discharge Site(s)

(1) Location. (Figures 1, 2, 3, 5, 6, 7, and 9)

(2) Size. The total construction right-of-way of the levee and berm system would be 1,252 acres. All of the impacts from the constructed features would be to either open water, swamp habitats or bottomland hardwoods (BLH) habitats. There would be a direct removal of 15 acres of open water, 1,112 acres of swamp and 123 acres of BLH habitats. The mitigation features will convert 156 of open water to BLH, and 699 acres of open water, 46 acres of farmland and 1,161 acres of crawfish ponds into swamp. The project would also enhance two areas of poor quality swamp by elevating 56 acres, and just planting 1,040 acres

(3) Type of Site. The project would be confined.

(4) Type(s) of Habitat. The existing habitat is cypress swamp, bottomland hardwoods, abandoned crawfish ponds, scrub shrub, and open water.

(5) Timing and Duration of Discharge. Various.

f. Description of Disposal Method. (hydraulic, drag line, etc) The levees and berm placed mechanically after being hauled in. Milton Island will use mechanical to build containment dikes and hydraulics to create platform. The crawfish ponds will have mechanically manipulation of onsite material.

II. Factual Determinations

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope

General:
Figure 11 depicts existing study area and project footprint LIDAR elevations. Elevations in the study area generally range between 0 and +8.8 ft (NAVD88). Within the footprint of the proposed levee right-of-way, elevations generally range between 0 and +1.3 ft, while elevations within the footprints of proposed berms are between +0.5 and +12.0 ft. Elevations within the footprint of the proposed SWMP3 project generally range between -1.0 and +2.0 ft; elevations within the footprint of the proposed BLH1 project generally range between -0.4 and +2.3 ft; elevations within the footprint of the proposed SWMP5 project generally range between -3.0 and +1.5 ft, while the SWMP5 range from -0.4 and +2.3 ft *(Please note: for the remaining proposed mitigation projects [SWMP1, SWMP2, and SWMP6], it is understood that no dredged or fill material would be placed into the aquatic environment, and therefore these projects do not require 404(b)(1) evaluation.)*

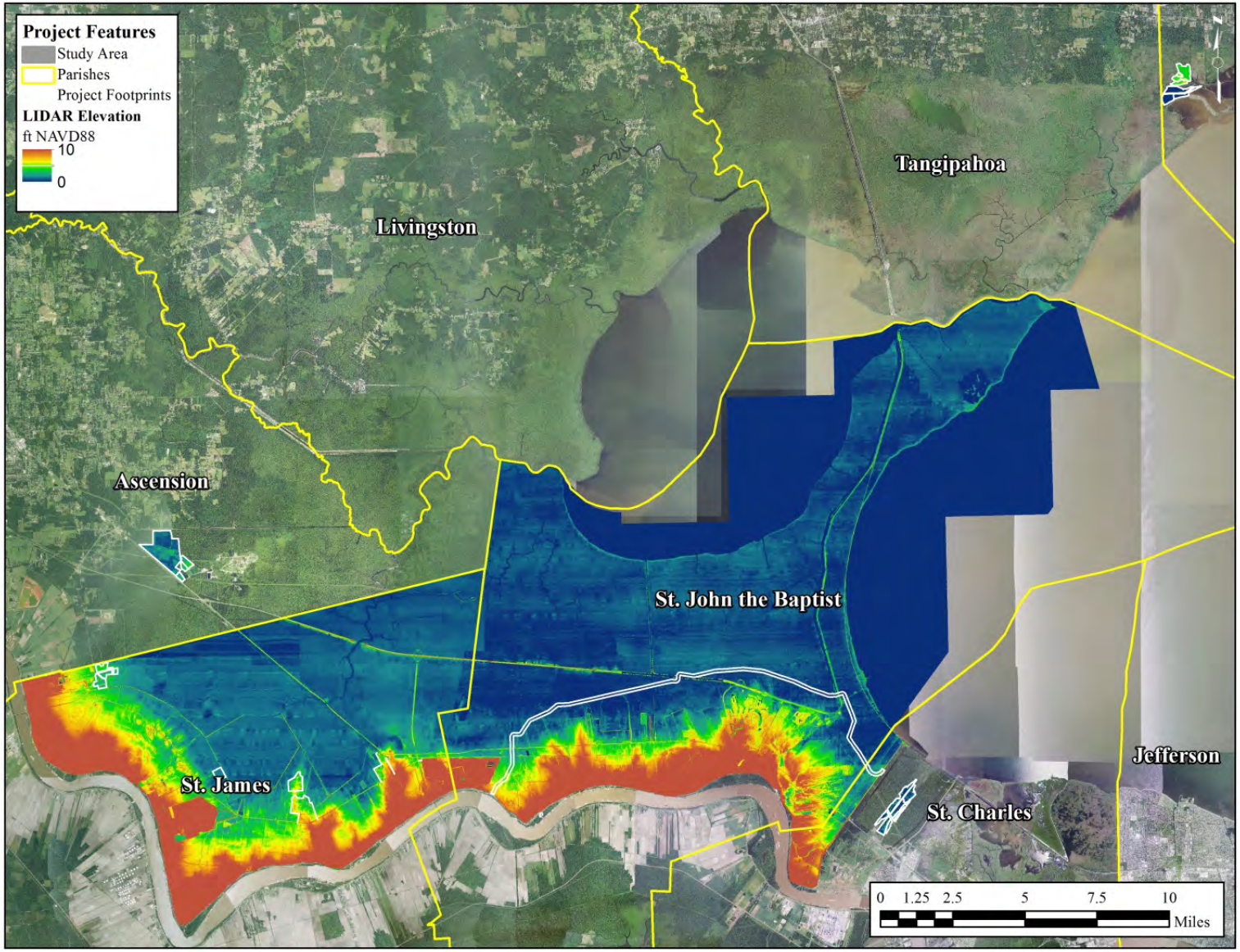


Figure 11: Study area and project footprint LIDAR Elevations

The alignment for the proposed levee starts at the Upper Guide Levee of the Bonnet Carré Spillway in St. Charles Parish, LA, extends west around the I-10/I-55 interstate interchange, and ends at the Mississippi River levee just west of Hope Canal in St. John the Baptist Parish, LA, covering a total distance of 18.3 miles (Figure 1). The proposed project includes thirteen floodwall reaches, four pumping stations, eight gravity drainage structures, two railroad swing gates, one gated road crossing, one floodgate, three berms, and the flood proofing of 23 structures. Figure 12 and Table 2 depict habitat types for the study area and project footprints.

Table 2: Project footprint existing habitat types

Project/Feature	Habitat	Area (acres)
Levee	Forested Wetlands/Swamp	1,112
	Bottom Land Hardwood	56
	Water	15
	Agriculture/Cropland/Grassland	51
	Vegetated Urban	3
Berms	Agriculture/Cropland/Grassland	10
	Bottom Land Hardwood	1
	Vegetated Urban	4
	Water	0.19
SWMP3	Wetland Scrub/Shrub Deciduous	5
	Water	305
BLH1	Wetland Scrub/Shrub Deciduous	2
	Water	154
SWMP4	Water	78
	Wetland Scrub/Shrub Deciduous	11
	Seasonally drained areas	1,072
SWMP5	Water	389
	Wetland Forest/swamp	56

Levee: Table 3 depicts approximate fill material quantities for the proposed alternative. Levees would be constructed in a total of 5 lifts. The proposed levee would be designed to a 1% probability storm level of risk reduction. Based on feasibility level hydraulic modeling, the final elevations for the proposed levee would range between approximately +19.5 ft NAVD88 on the eastern end of the alignment, to approximately +16 ft NAVD88 on the western end, and would have a footprint ranging between approximately 180 ft on the eastern end of the alignment and 80 ft on the western end.

Structures: Table 4 provides a summary of structure types and material quantities. The proposed road and railroad gates are located in existing upland areas, and are thus not subject to 404(b)(1) evaluation. At this time, material quantities for structures other than pump stations (including cofferdams, if required for construction) have not been developed.

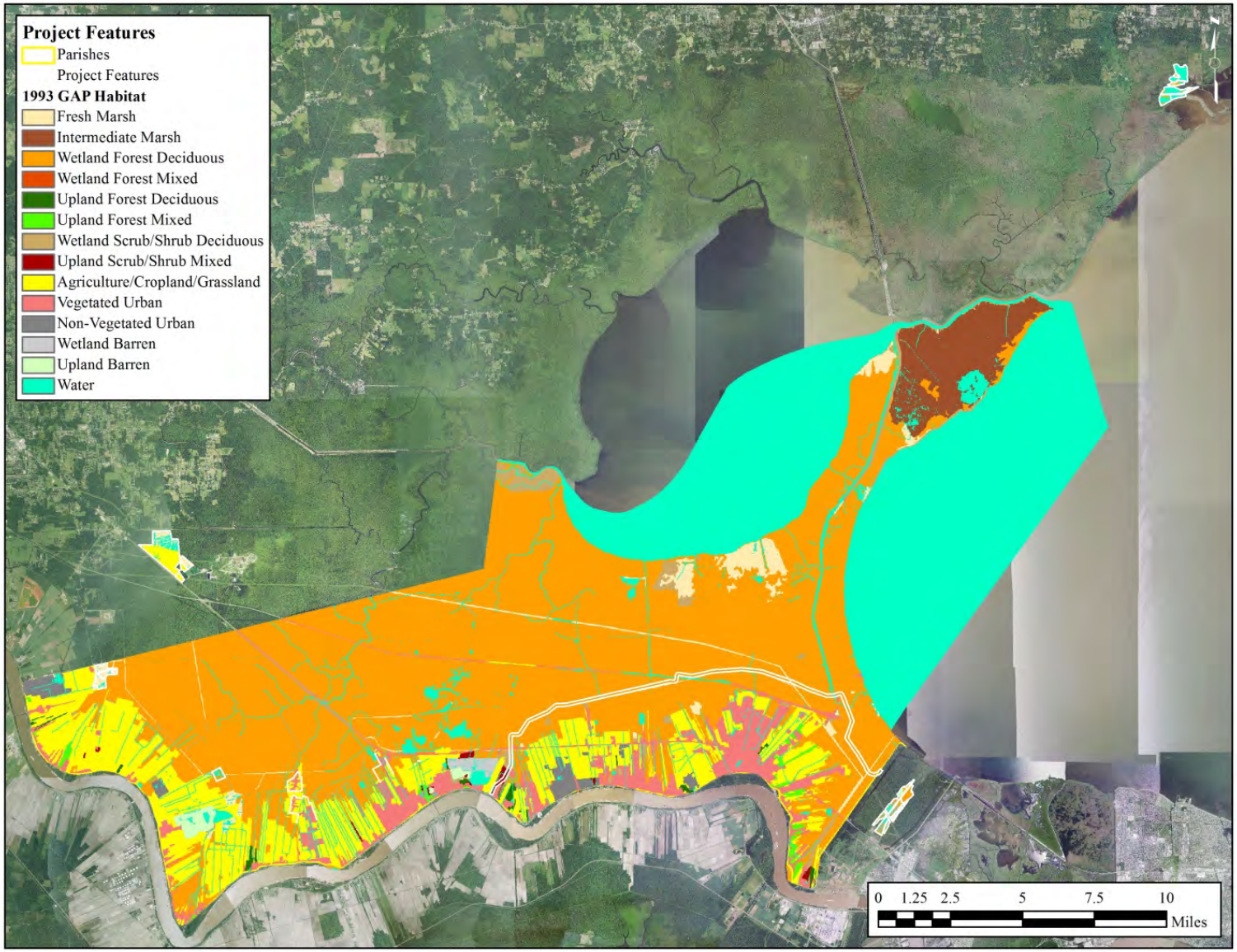


Figure 12: Study area and project footprint habitat types (source: USGS 1993)

Table3: Levee fill material quantities					
	Dimensions		Quantities		
			Levee Fill		
Section	Length (Miles)	Width (Approx.) (ft)	Compacted (yd^3)	Uncompacted (yd^3)	Aggregate Limestone (yd^3)
C-1	0.73	143	135,154	24,309	2,895
C-2	0.75	173	270,915	137,629	4,845
C-3	0.95	178	313,351	152,109	4,995
C-4	0.95	176	301,927	56,986	5,000
C-5	0.49	177	157,031	30,443	2,484
C-6	0.94	165	281,954	131,162	4,915
C-7	0.40	164	94,997	47,899	2,070
C-8	1.86	164	488,157	301,925	9,735
C-9	0.66	144	168,585	106,045	3,470
C-10	0.66	143	165,203	107,637	3,470
C-11	0.66	114	213,515	-	2,776
C-12	0.66	109	159,640	67,157	2,768
C-13	0.76	116	187,115	126,336	3,200
C-14	0.54	116	149,274	-	2,256
C-15	0.76	108	199,011	15,561	3,200
C-16	0.36	111	111,431	-	1,508
C-17	1.53	109	433,898	-	6,404
C-18	0.54	108	136,245	-	2,260
C-19	1.04	105	260,383	-	4,372
C-20	0.78	97	165,804	-	3,256
C-21	0.43	96	92,065	-	1,820
C-22	1.82	77	236,507	-	7,620
Totals:	**18.27**	--	**4,722,162**	**1,305,198**	**85,319**

Table 4: Structure dimensions and material quantities						
			Material Quantities			
Section	Structure Type(s)	Length	Concrete (yd^3)	Sheet pile (ft^2)	Rip rap (Tons)	Concrete Piles (Linear ft)
C-4	T-Wall	646	*NA*	*NA*	*NA*	*NA*
	Pump Station (1,100 ft^3/s), T-Wall, Drainage Structures (2-6 ft x 18 ft x 27 ft)	311	3,514	31,520	980	10,890
C-5	Road Gate	188	*NA*	*NA*	*NA*	*NA*
	T-Wall	247	*NA*	*NA*	*NA*	*NA*
C-7	T-Wall	550	*NA*	*NA*	*NA*	*NA*
C-8	T-Wall	17	*NA*	*NA*	*NA*	*NA*
	Pump Station (200 ft^3/s), T-Wall, Drainage Structure (2-6 ft x 18 ft x	300	3,023	28,860	622	19,890

	26 ft)					
C-10	Floodgate	100	*NA*	*NA*	*NA*	*NA*
C-12	T-Wall	574	*NA*	*NA*	*NA*	*NA*
C-14	Pump Station (400 ft^3/s), T-Wall, Drainage Structure (2-6 ft x 20 ft x 25 ft)	395	3,159	31,270	980	21,300
C-17	T-Wall, Drainage Structure (6 ft x 10 ft x 25 ft)	287	*NA*	*NA*	*NA*	*NA*
C-18	T-Wall	400	*NA*	*NA*	*NA*	*NA*
C-19	T-Wall	300	*NA*	*NA*	*NA*	*NA*
C-20	Pump Station (450 ft^3/s), T-Wall, Drainage Structure (6 ft x 20 ft x 25 ft)	275	2,837	28,520	785	21,132
	T-Wall	301	*NA*	*NA*	*NA*	*NA*
	Railroad Gate	150	*NA*	*NA*	*NA*	*NA*
C-22	Railroad Gate	53	*NA*	*NA*	*NA*	*NA*

Nonstructural Features: Table 5 depicts dimensions and compacted fill quantities for berms included in the nonstructural project features. Nonstructural features include the proposed berms along with the flood proofing of 23 structures.

Table 5: Berm dimensions and compacted fill quantities

	Dimensions						Quantities
		Elevation		Width			
Berm Polder	Length (Miles)	Base (ft NAVD88)	Crown (ft NAVD88)	Crown (ft)	Berm (ft)	Side Slopes	Compacted Fill (yd^3)
Gramercy	2.01	+4.3	+6.5	4	18	1:3	237,000
Grand Point South	2.75	+4.5	+6.5	4	16	1:3	273,900
Grand Point North	2.06	+4	+6.5	4	20	1:3	286,800

Mitigation: Mitigation for the proposed hurricane protection project incorporating placement of dredged or fill material in the aquatic environment includes the previously developed SWMP3, BLH1, and SWMP5 projects. Table 6 displays dimensions and dredged material quantities for components of these projects that include placement of dredged material into the aquatic environment. For the SWMP3, BLH1, and SWMP5 projects, dredged material would be placed in areas confined by existing ridges to elevations conducive to swamp (for SWMP3 and SWMP5) and bottomland hardwood forest (for BLH1) creation.

Pipeline Relocations: A total of 36 pipelines would require relocation under the proposed alternative. With the exception of one pipeline relocation, all relocations would occur within the proposed levee right-of-way. The single pipeline relocation outside of the proposed levee right-of-way would occur within a pipeline corridor that has been previously environmentally cleared. Relocations would occur at the T-walls in sections C-5, C-7, C-18, C-19, and C-22. The compensability for pipeline relocations has not been determined at this time, future NEPA and

404 evaluation will be done either by the pipeline owner or USACE as appropriate.

Table 6: Mitigation project dimensions and material quantities							
	Dimensions						Quantities
	Retention Dike/Berm					Final Platform Elevation (ft NAVD88)	Dredged Material ($yd^{3)}$)
Project	Area (acres)	Berm Elevation: Base (ft NAVD88)	Berm Elevation: Crown (ft NAVD88)	Berm Width (ft)	Side Slopes		
SWMP3	310					+0.5	1,400,000
BLH1	156					+1.5	810,000
SWMP5	445	+1.0	+5.0	5	1:4	+0.5	2,700,000
SWMP4	1161					+0.5	

(2) Sediment Type

General: Sediment types and corresponding area within the footprints of the proposed project and proposed mitigation projects are depicted in Table 7 (USDA 2014). Most soils within the footprint of the proposed project features are very poorly drained and very frequently flooded, with a mucky or loamy surface layer and clayey subsoil, occurring in broad, low swamp and marsh areas. More information regarding soil types within the footprint of the proposed project and proposed mitigation projects, including soil type descriptions, can be found in USDA (1973, 1987, 1991, 2009).

Table 7. Project footprint soil types			
Project/Feature	Soil Code	Soil Type	Area (acres)
Levee Right-of-Way	Ba	Barbary Soils, Frequently Flooded	665.2
	CT	Cancienne and Carville Soils, Gently Undulating, Frequently Flooded	308.1
	Sm	Schriever Clay, Frequently Flooded	89.2
	GrA	Gramercy Silty Clay, Undulating	61.1
	SkA	Schriever Clay, 0 to 1 Percent Slopes	27.5
	Cn	Commerce Silty Clay Loam, Frequently Flooded	22.8
	FA	Fausse Clay	22.8
	CmA	Cancienne Silt Loam, 0 to 1 Percent Slopes	16.4
	LV	Levees, 0 to 25 Percent Slope	2.3
Berms	CmA	Cancienne Silt Loam, 0 to 1 Percent Slopes	8.6
	Sm	Schriever Clay, Frequently Flooded	2.7
	CnA	Cancienne Silty Clay Loam, 0 to 1 Percent Slopes	1.3
	GrA	Gramercy Silty Clay, Undulating	1.2
	SkA	Schriever Clay, 0 to 1 Percent Slopes	0.6
	VhA	Vacherie Silty Sandy Loam	0.4
SWMP3	CR	Convent and Commerce Soils, Frequently Flooded	310.3
BLH1	CR	Convent and Commerce Soils, Frequently Flooded	146.1

SWMP4	Sf	Sharkey Clay, 0 To 1 Percent Slopes, Frequently Flooded	561.0
	BA	Barbary Muck, 0 To 1% Slope, Frequently Flooded	267.0
	Sm	Schriever Clay, 0 To 1% Slopes, Frequently Flooded	223.2
	Fo	Foley-Deerford Complex	3.2
	SkA	Schriever Clay, 0 To 1 Percent Slopes	2.7
SWMP5	Ha	Harahan Clay	219.1
	Md	Maurepas Muck, Drained	13.6
	BB	Barbary Mucky Clay, 0 To 1 % Slopes, Frequently Flooded	4.7
	St	Stough Fine Sandy Loam	3.6

Levee: Borrow material for the initial lift will be obtained from the Bonnet Carré Spillway and from adjacent protected and flood side wetlands within the proposed levee right-of-way. Material for future lifts will come from Bonnet Carré only. Previous testing of spillway sediments used as borrow material for other projects suggests that spillway material consists of high plasticity clay interspersed with low plasticity clay and silt, while borings in the vicinity of the proposed levee right-of-way suggest the subsurface material proposed for excavation primarily consists of low- and high-plasticity clays.

Material used for levee construction will be levee grade material meeting HSDRRS Guidelines. Levee grade material is currently defined and specified as follows: earth materials naturally occurring or contractor blended materials that are classified in accordance with ASTM D2487 as clay (CL) or high plasticity, fat clay (CH) with less than 35% sand content are suitable for use as embankment fill (Materials classified as silt [ML] are suitable if blended to produce a material that classifies as CH or CL according to ASTM D 2487). Materials shall be free from masses of organic matter, sticks, branches, roots, and other debris including hazardous and regulated solid wastes. Isolated pieces of wood will not be considered objectionable in the embankment provided their length does not exceed 1 foot, their cross-sectional area is less than 4 square inches, and they are distributed throughout the fill. Not more than 1 percent (by volume) of objectionable material shall be contained in the earthen material placed in each cubic yard of the levee section. Pockets and/or zones of wood shall not be placed in the embankment. Materials placed in the section must be at or above the Plasticity Index of 10. Materials placed in the section must be at or below organic content of 9 percent by weight, as determined by ASTM D 2974, Method C.

Structures: Fill material used in construction of structures would either consist of backfill from adjacent areas, or offsite borrow. Adjacent backfill characteristics would be dependent on location and depth; however, as described earlier, a majority of soils within the footprint of the proposed alternative are considered to be very poorly drained, flooded soils with a mucky or loamy surface layer and clayey subsoil. Both adjacent and offsite borrow material may be required to meet HSDRRS guidelines for levee grade material.

Nonstructural Features: Borrow material for berm construction would be derived from the Bonnet Carré Spillway (physical properties of spillway sediments are described earlier in this section). Material borrowed from the spillway would be required to meet HSDRRS guidelines for levee grade material (as described earlier in this section).

Mitigation: For the SWMP3 and BLH1 projects, the topmost 4 ft of material excavated for proposed levee flood and protected side canal construction would be used for construction of

project features. This material is assumed to be highly organic and unsuitable for use as levee fill. Approximately 3.2 million cubic yards of material is expected to be available from canals for use in the SWMP3 and BLH1 projects. For the SWMP5 project, borrow material would be derived from adjacent Lake Pontchartrain waterbottoms, in a 139 acre area located approximately 2,000 ft from the shoreline. Approximately 2.7 million cubic yards of borrow material would be required for mitigation.

(3) Dredged/Fill Material Movement

Levee: Material placed for levee construction would be contained within the levee right of way with berms or small dikes. Movement of material beyond the levee right of way is not anticipated.

Structures: Structure materials, including any associated cofferdams, would not be expected to move or shift after final material placement.

Nonstructural Features: Fill material placed for berm construction is not expected to move after final material placement.

Mitigation: For the SWMP3 and BLH1 projects, material would be confined by existing ridges. However, if restoration sites are not sufficiently established prior to a significant spillway opening, they may experience high water velocities capable of eroding fine sediments, which could in effect scour restoration project sediments. Water velocities in the center of the spillway can approach 20 ft/s during openings, which is much higher than velocities permissibly for preventing scour of even gravel (Departments of the Army and Air Force, 1983). For the SWMP5 project, dredged material would be confined by earthen dikes, and is not expected to shift after initial settlement of dredged material used for swamp creation platform construction.

(4) Physical Effects on Benthos (burial, changes in sediment types, etc)

Levee: Sessile aquatic organisms within the footprint of the proposed levee would be smothered by placement of fill and construction materials, and these organisms would not be expected to reestablish.

Structures: Sessile aquatic organisms within the footprint of proposed structures would be smothered by placement of fill and construction materials, and these organisms would not be expected to reestablish. Cofferdam construction, if implemented for construction of any structures included in the proposed project, would also smother sessile aquatic organisms. Following cofferdam removal, sessile and mobile aquatic organisms are expected to reestablish within cofferdam footprints.

Nonstructural Features: Sessile aquatic organisms within the footprint of the berm sections that coincide with aquatic habitat would be smothered by placement of fill and construction materials, and these organisms would not be expected to reestablish.

Mitigation: Placement of dredged material would smother sessile aquatic organisms within the footprints of mitigation areas; following construction activities, organisms adapted to survival in newly established habitat (swamp for SWMP3/SWMP5 and bottomland hardwood forest for BLH1) would populate the areas.

(5) Other Effects

(6) Actions Taken to Minimize Impacts:

Confinement dikes, berms, and existing ridges would be used to prevent lateral movement of dredged, fill, and construction materials during construction activities. The route of the levee was chosen over the other two alternatives because it had the smallest direct footprint and avoided some wetland impacts. The nonstructural features avoids impacts to wetlands by being placed in agricultural fields or in urban yards.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water

(a) Salinity

General: A major component of the proposed project includes the construction of eight gravity drainage structures along the proposed levee alignment (See II.a.(1) (Substrate Elevation and Slope)). The purpose of the gravity drainage structures is to provide flood control during storm conditions and to match existing drainage patterns during non-storm conditions. In addition, to minimize impacts to hydrology from the proposed project, canals will be constructed adjacent to the proposed levee alignment, on both the flood and protected sides. The intent of drainage features incorporated into the project includes minimizing project impacts to existing study area salinity patterns.

Because the proposed levee alignment would create a new hydrologic barrier along some reaches, the proposed project has the potential to induce changes to water circulation and water level patterns in the study area, despite the incorporation of gravity drainage structures and canals into the proposed alternative. These localized changes in water circulation and water level patterns may induce localized changes in salinity levels within the study area.

Levee: Because fill material used for levee construction would be dewatered prior to placement, placement of fill for levee construction would have little direct impact on the salinities of adjacent waters.

Structures: It is expected that material used for structure backfill and cofferdam construction would be dewatered prior to placement. Placement of dewatered fill materials for construction of structures would have little direct impact on the salinities of adjacent waters. Construction materials are not expected to contain salts and therefore would not directly impact the salinities of adjacent water bodies. Cofferdams, if implemented, would have the potential to temporarily alter salinity gradients, by restricting or eliminating surface water flows during construction activities. Upon removal of cofferdams, changes to salinity gradients are expected to return to previous conditions.

Nonstructural Features: Because fill material used for berm construction would be dewatered prior to placement, because berms generally do not encroach on existing wetlands, and because berms are located in areas removed from saline surface waters, placement of fill for berm construction would have little direct or indirect impact on the salinities of adjacent surface waters.

Mitigation: For the SWMP3, SWMP4 and BLH1 projects, because proposed borrow material would be derived from a relatively freshwater region, and because the restoration footprints are

expected to be freshwater, no direct impacts to salinity are expected from placement of dredged material for swamp and bottomland hardwood forest restoration. For the SWMP5 project, because borrow material would be derived from adjacent Lake Pontchartrain waterbottoms, hydraulic placement of material for swamp creation is expected to introduce waters with salinities slightly higher than those currently within the swamp creation site. Following site dewatering and swamp platform consolidation, platform confinement dikes would be gapped, and site salinities would be controlled by site interactions with local surface waterbodies.

(b) Water Chemistry (pH, etc.)

General: Ambient surface water pH values for study area monitoring stations generally range between 6.7 and 7.2, with median values of 6.9 and 7.0.

Placement of dredged and fill materials can result in short term effects on pH. Factors typically associated with dredged and fill material placement activities may cause pH in receiving area waters to shift toward more acidic conditions. These factors include increased turbidity, organic enrichment, chemical leaching, reduced dissolved oxygen, and elevated carbon dioxide levels, among others.

A major component of the proposed project includes the construction of eight gravity drainage structures along the proposed levee alignment (See II.a.(1) (Substrate Elevation and Slope)). The purpose of the gravity drainage structures is to provide flood control during storm conditions and to match existing drainage patterns during non-storm conditions. In addition, to minimize impacts to hydrology from the proposed project, canals will be constructed adjacent to the proposed levee alignment, on both the flood and protected sides. The intent of drainage features incorporated into the project includes minimizing project impacts to existing study area water quality.

Because the proposed levee alignment would create a new hydrologic barrier along some reaches, the proposed project has the potential to induce changes to water circulation and water level patterns in the study area, despite the incorporation of gravity drainage structures and canals into the proposed alternative. These localized changes in water circulation and water level patterns may induce localized changes in pH levels within the study area.

Levee: Material proposed for use as levee fill would be confined by berms. Therefore, only minimal amounts of fill material (primarily material associated with berm construction) would directly impact adjacent waterbodies. Associated impacts to surface water pH levels from placement of levee fill material would therefore be localized and temporary.

Structures: Minor and localized impacts to pH levels in adjacent waters may occur during placement of cofferdam, construction, and backfill materials. These impacts would be expected to last the duration of construction activities. Cofferdams, if implemented, would have the potential to temporarily alter pH levels, by restricting or eliminating surface water flows during construction activities. Upon removal of cofferdams, changes in pH associated with cofferdams would diminish.

Nonstructural Features: Because fill material used for berm construction would be dewatered prior to placement, and because berms generally do not encroach on existing wetlands, placement of fill for berm construction would have little direct or indirect impact on the pH of

adjacent surface waters.

Mitigation: For both the SWMP3, BLH1, and SWMP5 projects, dredged material discharges would be expected to result in a temporary reduction in pH for adjacent waters. For the SWMP3 and BLH1 projects, dredged material effluent would presumably discharge from restoration areas to adjacent borrow ponds, causing temporary reductions in pH within those ponds. For the SWMP5 project, the limited currents present placement of hydraulically dredged material is expected to result in a temporary reduction in the pH of dredged material effluent. Effluent waters of reduced pH are expected to enter adjacent water bodies, where they would be dispersed at a rate dependent upon receiving water body flow characteristics.

(c) Clarity

General: Placement of dredged and fill material is expected to result in localized turbidity plumes, which could affect water clarity and color. Following completion of construction activities and vegetation of constructed project features, the occurrence of these turbidity plumes would no longer occur.

To minimize construction-related impacts to surface water, including water clarity and turbidity, a Stormwater Pollution Prevention Plan (SWPPP) will be implemented for construction activities. SWPPPs will be prepared in accordance with good engineering practices emphasizing storm water Best Management Practices and complying with Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology. The SWPPP will identify potential sources of pollution which may reasonably be expected to affect storm water discharges associated with the construction activity. In addition, the SWPPP will describe and ensure the implementation of practices which are to be used to reduce pollutants in storm water discharges associated with the construction activity and to assure compliance with the terms and conditions of this permit (USEPA 2012).

(d) Color

See Section 2.b.(1)(c) (Clarity)

(e) Odor

General: No significant odors are anticipated to be associated with dewatered borrow material from the Bonnet Carré Spillway or construction materials.

Mitigation: Discharge of dredged sediments for the SWMP3, BLH1, and SWMP5 projects would result in the exposure of previously undisturbed, organic and reduced sediments, which would emit odors. Because restoration sites are removed from developed areas, this is not expected to be of concern.

(f) Taste

The nearest surface drinking water intakes to the study area are located on the Mississippi River, which is hydrologically isolated from the study area by the Mississippi River levees. The proposed projects are therefore not expected to affect area drinking water resources.

(g) Dissolved Gas Levels

General: Ambient dissolved oxygen values for the project area water quality monitoring stations are generally very low, ranging between 1 and 4 mg/L, with median concentrations of 1.6 and 3.1 mg/L. As discussed in Appendix *A annex M of the EIS,* low dissolved oxygen level is the second most commonly cited suspected cause of impairment for study area water bodies.

A major component of the proposed project includes the construction of eight gravity drainage structures along the proposed levee alignment (See II.a.(1) (Substrate Elevation and Slope)). The purpose of the gravity drainage structures is to provide flood control during storm conditions and to match existing drainage patterns during non-storm conditions. In addition, to minimize impacts to hydrology from the proposed project, canals will be constructed adjacent to the proposed levee alignment, on both the flood and protected sides. The intent of drainage features incorporated into the project includes minimizing project impacts to existing study area water quality.

Because the proposed levee alignment would create a new hydrologic barrier along some reaches, the proposed project has the potential to induce changes to water circulation and water level patterns in the study area, despite the incorporation of gravity drainage structures and canals into the proposed alternative. These localized changes in water circulation and water level patterns may induce localized changes in dissolved oxygen levels within the study area.

Recent significant changes in the Federal flood insurance program (stemming from passage of the Biggert-Waters Flood Insurance Reform Act) will likely have the effect of establishing dramatically lower flood insurance rates in areas within the West Shore Lake Pontchartrain levee. This could create a significant financial incentive for development within the levee alignment, which could amplify athropogenic influences on water quality within the proposed alignment and study area, influencing dissolved oxygen levels.

Levee: Material proposed for use as levee fill would be confined by berms. Therefore, only minimal amounts of fill material (primarily material associated with berm construction) would directly impact adjacent water bodies. Associated impacts to the water column from placement of levee fill material would therefore be localized and temporary.

Structures: Minor, localized impacts to dissolved oxygen levels in adjacent waters may occur during placement of cofferdam, construction, and backfill materials. These impacts would be expected to last the duration of construction activities. Cofferdams, if implemented, would have the potential to temporarily alter dissolved oxygen levels, by restricting or eliminating surface water flows during construction activities. Upon removal of cofferdams, changes in dissolved oxygen levels associated with cofferdams would diminish.

Nonstructural Features: Because fill material used for berm construction would be dewatered prior to placement, and because berms generally do not encroach on existing wetlands, placement of fill for berm construction would have little direct or indirect impact on the dissolved oxygen levels of adjacent surface waters.

Mitigation: For the SWMP3, BLH1, SWMP4 and SWMP5 projects, short-term decreases in dissolved oxygen could occur due to introduction of organics from sediment into the water column, as well as the release of nutrients. Turbidity affects water quality in several ways, which can include the reduction of dissolved oxygen levels. The introduction of nutrients and organic material from sediments discharged into the water column can lead to a high biochemical oxygen demand (BOD), which in turn can lead to reduced dissolved oxygen, thereby potentially affecting the survival of aquatic organisms. For all mitigation projects, the proposed dredged

material to be used for construction of project features is expected to be highly organic, and therefore there is potential for temporarily lowering dissolved oxygen levels.

(h) Nutrients

General: A major component of the proposed project includes the construction of eight gravity drainage structures along the proposed levee alignment (See II.a.(1) (Substrate Elevation and Slope)). The purpose of the gravity drainage structures is to provide flood control during storm conditions and to match existing drainage patterns during non-storm conditions. In addition, to minimize impacts to hydrology from the proposed project, canals will be constructed adjacent to the proposed levee alignment, on both the flood and protected sides. The intent of drainage features incorporated into the project includes minimizing project impacts to existing study area water quality.

Because the proposed levee alignment would create a new hydrologic barrier along some reaches, the proposed project has the potential to induce changes to water circulation and water level patterns in the study area, despite the incorporation of gravity drainage structures and canals into the proposed alternative. These localized changes in water circulation and water level patterns may induce localized changes in the distribution of nutrients within the study area.

Levee: Material proposed as levee fill would be confined by berms. Therefore, only minimal amounts of fill material (primarily material associated with berm construction) would directly impact adjacent waterbodies. Associated impacts to the water column from placement of levee fill material would therefore be localized and temporary.

Structures: Fill and construction materials used for structure and cofferdam construction are not expected to contain high nutrient levels. Therefore, placement of these materials for structure construction is not expected to directly impact nutrient levels for adjacent surface waters.

Nonstructural Features: Material proposed as berm fill would be largely relegated to upland areas, and would be dewatered prior to placement. Therefore, only minimal amounts of fill material (primarily material associated with berm construction) would directly impact adjacent waterbodies. Associated impacts to the water column from placement of berm fill material would therefore be localized and temporary.

Mitigation: Sediments proposed as borrow material for mitigation sites are expected to contain variable levels of organic material, which may release elevated concentrations of ammonia during construction activities related to wetland restoration. For the SWMP3 and BLH1 projects, any ammonia released would be contained in waters within existing ridges, where its fate would be determined by soil biogeochemistry. For the SWMP5 and SWMP4 project, any ammonia released would enter adjacent surface waters, where its fate would be determined by waterbody flow characteristics and area biogeochemistry.

(i) Eutrophication

See Section 2.b.(1)(h) (Nutrients)

(j) Others as Appropriate

(2) Current Patterns and Circulation

(a) Current Patterns and Flow

General: A major component of the proposed project includes the construction of eight gravity drainage structures along the proposed levee alignment (See II.a.(1) (Substrate Elevation and Slope)). The purpose of the gravity drainage structures is to provide flood control during storm conditions and to match existing drainage patterns during non-storm conditions. In addition, to minimize impacts to hydrology from the proposed project, canals will be constructed adjacent to the proposed levee alignment, on both the flood and protected sides.

Because the proposed levee alignment would create a new hydrologic barrier along some reaches, the proposed project has the potential to induce changes to water circulation and water level patterns in the study area, despite the incorporation of gravity drainage structures and canals into the proposed alternative.

Levee: The proposed levee footprint within existing aquatic habitat would be converted to upland habitat, thus eliminating surface waters within the footprint.

Structures: The proposed structures whose footprints are within existing aquatic habitat would convert their footprints to upland habitat, with the exception of structure openings, thus eliminating surface waters within portions of structure footprints.

Nonstructural Features: The proposed berm footprints within existing aquatic habitat would be converted to upland habitat, thus eliminating surface waters within the footprints. Proposed berms are expected to hydrologically isolate small areas of existing wetlands; approximately 117 acres of existing forested wetlands are present within the proposed berms.

Mitigation: For the SWMP3, BLH1, and SWMP5 projects, existing hydrology and flow patterns within restoration areas would be modified via conversion of these areas to swamp and bottomland hardwood forest habitat. For the SWMP3 and BLH1 projects, if restoration areas are successfully established, they may affect hydrology and flow patterns within the spillway, as these areas are in an area of the spillway previously cleared to reduced susceptibility of spillway guide levees to erosion. Hydraulic modeling is currently being performed to estimate the effects of the SWMP3 and BLH1 projects on spillway flows and water levels.

For the SWMP5 project, the area would be converted from open water area to swamp, thus altering area current patterns and flow. The longevity of these conditions would be dependent upon project success. The swamp creation area and surrounding areas have undergone significant hydromodification which may be a central cause of local wetland loss; without significant changes in site hydrology, wetlands in the SWMP5 area may suffer a similar fate as wetlands previously converted to open water in the area.

(b) Velocity

See II.b.(2)(a) (Current Patterns and Flow)

(c) Stratification.

Because project area salinities are generally low and area water bodies are generally shallow (less than 10 ft in depth), the proposed alternative is not expected to contribute to water column stratification.

(d) Hydrologic Regime.

See II.b.2(a) (Current Patterns and Flow **)**

(3) Normal Water Level Fluctuations/Hydroperiod.

See II.b.(2)(a) Current Patterns and Flow

(4) Salinity Gradients.

See II.b.(1)(a) (Salinity)

(5) Actions That Would Be Taken to Minimize Impacts.

A major component of the proposed project includes the construction of eight gravity drainage structures along the proposed levee alignment (See II.a.(1) (Substrate Elevation and Slope)). The purpose of the gravity drainage structures is to provide flood control during storm conditions and to match existing drainage patterns during non-storm conditions. In addition, to minimize impacts to hydrology from the proposed project, canals will be constructed adjacent to the proposed levee alignment, on both the flood and protected sides.

To minimize construction-related impacts to water quality, it is anticipated that a Stormwater Pollution Prevention Plan (SWPPP) shall be implemented for construction activities. SWPPPs shall be prepared in accordance with good engineering practices emphasizing storm water Best Management Practices and complying with Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology. The SWPPP shall identify potential sources of pollution, which may reasonably be expected to affect storm water discharges associated with the construction activity. In addition, the SWPPP shall describe and ensure the implementation of practices which are to be used to reduce pollutants in storm water discharges associated with the construction activity and to assure compliance with the terms and conditions of this permit.

Levee: Material will be placed between levee berms, minimizing water column impacts associated with levee construction.

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site

Levee: Material proposed as levee fill would be confined by berms. Therefore, only minimal amounts of fill material (primarily material associated with berm construction) would directly impact adjacent waterbodies. Associated impacts to the water column from placement of levee fill material would therefore be localized and temporary.

Structures: Minor, localized impacts to turbidity levels and water clarity in adjacent waters may occur during placement of cofferdam, construction, and backfill materials. These impacts would be expected to last the duration of construction activities.

Mitigation: For the SWMP3 and BLH1 projects, material would be placed within existing ridges, which would allow for settling of suspended solids prior to effluent discharge from restoration

areas. For the SWMP5 project, material would be hydraulically placed in a confined swamp creation site, where suspended particulates would be expected to settle prior to effluent discharge. For all projects, any effluent waters would be expected to contain elevated turbidities which would be reduced depending on receiving waterbody flow characteristics.

(2) Effects on Chemical and Physical Properties of the Water Column.

(a) Light penetration

See II.c.(1) (Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site)

(b) Dissolved oxygen

See section II.b.(1)(g) (Dissolved Gas Levels)

(c) Toxic metals and organics

See section II.d (Contaminant Determinations)

(d) Pathogens

As discussed in Appendix A annex M of the EIS elevated fecal coliform densities is the fourth most commonly cited suspected cause of impairment for study area waterbodies. Because the proposed levee alignment would create a new hydrologic barrier along some reaches, the proposed project has the potential to induce changes to water circulation and water level patterns in the study area, despite the incorporation of gravity drainage structures and canals into the proposed alternative. These localized changes in water circulation and water level patterns may induce localized changes in the distribution of waterborne pathogens within the study area.

d. Contaminant Determinations.

General: As a screening-level assessment of contaminants in proposed dredged and fill material proposed for placement in the aquatic environment under the proposed projects, sediment chemistry data for proposed borrow areas was collected. Chemistry data was only available for the spillway (Mielke et al. 2001).

Comparison of available data (Table 8) to freshwater sediment benchmarks (NOAA 2008) suggests some low-level PAH and cadium contamination may be present in spillway sediments.

As stated earlier, Material borrowed from the spillway would be required to meet HSDRRS guidelines for levee grade material, which includes the specification that it should be free of hazardous and regulated solid wastes.

Mitigation: Dredged Material for the SWMP3, BLH1, and SWMP5 projects would be derived from isolated areas, which are presumed to be relatively un-impacted by human activities. Material is therefore expected to be relatively free of contaminants.

Table 8. Bonnet Carré Spillway Sediment Chemistry Data

Chemical Class	Parameter	N	Min	10%	25%	Median	75%	90%	Max	NOAA Sediment Screening Values for Freshwater Sediment *Predicted Toxicity Gradient: Increasing →* ARCS Hyalella TEL	TEL	TEC	LEL	PEL	PEC	SEL	UET
Metals	Lead	5	4,100	4,100	4,600	6,900	13,900	17,300	17,300	37,000	35,000	35,800	31,000	91,300	128,000	250,000	127,000 H
	Zinc	5	11,600	11,600	12,500	18,900	26,700	36,400	36,400	98,000	123,000	121,000	120,000	315,000	459,000	820,000	520,000 M
	Cadmium	5	300	300	1,000	1,400	1,600	2,000	2,000	583	596	990	600	3,530	4,980	10,000	3,000 I
	Manganese	5	54,000	54,000	110,000	147,000	254,000	291,000	291,000								
	Nickel	5	1,000	1,000	3,700	5,600	8,900	10,500	10,500	19,514	18,000	22,700	16,000	36,000	48,600	75,000	43,000 H
	Copper	5	1,300	1,300	2,100	4,500	13,200	14,500	14,500	28,012	35,700	31,600	16,000	197,000	149,000	110,000	86,000 I
	Chromium	5	400	400	700	1,100	1,600	1,700	1,700	36,286	37,300	43,400	26,000	90,000	111,000	110,000	95,000 H
	Vanadium	5	800	800	1,900	3,200	8,900	10,500	10,500								
PAHs	Naphthalene	5	-	-	-	9	33	46	46	14.7	34.6 c	176		391 c	561		600 I
	Acenaphthylene	5	-	-	-	-	1	5	5		5.87 c			128 c			
	Acenaphthene	5	-	-	-	-	1	6	6		6.71 c			88.9 c			290 M
	Fluorene	5	-	-	-	-	7	14	14	10.0	21.2 c	77.4	190	144 c	536	1,600	300 M
	Phenanthrene	5	27	27	33	36	52	72	72	18.7	41.9	204	560	515	1,170	9,500	800 I
	Anthracene	5	-	-	3	4	6	10	10	10.0	46.9 c	57.2	220	245 c	845	3,700	260 M
	Fluoranthene	5	12	12	28	54	57	65	65	31.5	111	423	750	2,355	2,230	10,200	1,500 M
	Pyrene	5	8	8	24	56	62	63	63								
	Benz(a)anthracene	5	-	-	-	41	44	48	48	15.7	31.7	108	320	385	1,050	14,800	500 I
	Chrysene	5	-	-	4	14	25	28	28	26.8	57.1	166	340	862	1,290	4,600	800 I
	Benzo(k)fluoranthene	5	-	-	-	52	70	108	108	27.2			240			13,400	13,400 B
	Benzo(j)fluoranthene	5	-	-	3	4	7	7	7								
	Benzo(a)pyrene	5	-	-	-	-	45	54	54	32.4	31.9	150	370	782	1,450	14,400	700 I
	Indeno(1,2,3-cd)pyrene	5	-	-	7	10	14	23	23	17.32			200			3,200	330 M
	Dibenz(a,h)anthracene	5	-	-	5	8	11	17	17	10.0	6.22 c	33.0	60.0	135 c		1,300	100 M
	Benzo(g,h,i)perylene	5	-	-	-	-	5	7	7				170			3,200	300 M

e. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton.

Levee / Nonstructural Features: Because of the presence of a forest canopy and floating vegetation (primarily salvinia and water hyacinth), a plankton community within the swamps is unlikely to be a significant resource. Therefore the placement of material would have little, if any, effect on plankton.

Mitigation: It is likely that a plankton community is present in the open water areas in the Bonnet Carré and Milton Island. The excavation and movement of material to construct the mitigation is likely to create sufficient turbidity in the vicinity of construction to adversely affect

(2) Effects on Benthos. *Levee / Nonstructural Features/ Mitigation:* Benthic organisms would be smothered by the placement of clay and dredged material at the sites and eliminate benthic habitats.

(3) Effects on Nekton. *Levee:* Some species of the nekton community would be temporarily displaced during construction operations. The levee footprint in the swamp and open water areas will remove foraging, breeding, spawning, and cover habitat for a variety of adult and juvenile fishes.

Structure: The levee and structures combination reduces the value of the wetlands enclosed by approximately 34%. This would have an indirect impact on nekton that uses those wetlands

Nonstructual Features: No effects.

Mitigation: Reestablishment of hydrologic connectivity to restored swamp would enable the utilization of numerous microenvironments by juvenile fishes.

(4) Effects on the Aquatic Food Web. *Levee/Non Structural:* The levee footprint would impact the aquatic food web. The levee would remove 1,112 acres of swamp and 123 acres of BLH.

Mitigation: At all mitigation sites aquatic food web would benefit from both short and long-term changes resulting from the wetland mitigation projects, including additions in energy to basal elements of the food web, habitat preservation, and increased habitat complexity. Nutrients and detritus provided by the connection to swamp habitats would be added to the existing food web. The proposed action would reestablish numerous microenvironments that would be utilized by invertebrates and juvenile fishes that serve as prey items for larger fauna.

(5) Effects on Special Aquatic Sites.

(a) Sanctuaries and Refuges. Two potentially active water bird rookeries exist within 1,000 feet of the selected levee alignments. Before construction surveys of the area would be conducted by the USFWS and CEMVN biologists to confirm whether the rookeries are active or not. If active, USFWS guidelines would be utilized during construction to avoid any impacts to the above described species, if encountered.

Levee: The levee will directly impact 204.6 acres and indirectly impact 241.2 aces of swamp habitat that is part of the Maurepas Swamp wildlife management area (WMA).

Nonstructual Features: No effects.
Mitigation: Approximately 1,027.8 acres of the planting at Blind River (SWMP2) site is on the WMA and will fully compensate for impacts to the WMA from the levee.

(b) Wetlands. *Levee/Non Structural:* The levee would remove 1,112 acres of swamp and 123 acres of BLH and enclose 8,432 acres of swamp and 89 acres of BLH.

Mitigation: The complete mitigation plan (Table 1) will fully compensate for the impacts to swamp and BLH due to this project.

(c) Mud Flats. Not applicable.

(d) Vegetated Shallows. *Levee:* Submerged aquatic vegetation occurs within the project area. The placement of clay material for levee construction will create unsuitable conditions for their continued vigor by: covering them up, changing water circulation patterns, releasing nutrients that increase undesirable algal populations, and increasing turbidity levels during construction, thereby reducing light penetration and hence photosynthesis.

Mitigation: The connection to swamp habitats would reestablish numerous microenvironments including some freshwater vegetated shallows.

(e) Coral Reefs. Not applicable.

(f) Riffle and Pool Complexes. Not applicable.

(6) Threatened and Endangered Species. *Levee/Nonstructual/Mitigation*: Implementing the selected plan has been determined as not likely to adversely affect any of the listed species or their critical habitat.

(7) Other Wildlife. *Levee/Nonstructual/Mitigation*: There are active bald eagle nests in the area; however, based on information provided by USFWS, all nests are beyond 660 feet from the selected project alignments and therefore are not expected to be adversely affected. Two potentially active water bird rookeries exist within 1,000 feet of the selected alignments. Before construction surveys of the area would be conducted by the USFWS and CEMVN biologists to confirm whether the rookeries are active or not. If active, USFWS guidelines would be utilized during construction to avoid any impacts to the above described species, if encountered.

(8) Actions to Minimize Impacts. *Levee/Nonstructual/Mitigation*: Adverse impacts on benthic organisms are unavoidable. However, the loss of benthic habitat by the placement of excavated/dredged material on the swamp floor would be compensated by the wetland mitigation proposed for the project. Additional benthic habitat would be provided by the construction of conveyance channels. The levee alignment chosen minimized the direct impact to wetlands because it was shorter than the other action alternatives. The berms avoided impact to wetlands by being placed primarily on agricultural fields.

The plankton community of the project would be affected by increased concentrations of turbidity/suspended solids during construction. Best management practices, such as silt fencing

and hay bales, would minimize impacts. Turbidity/suspended solid concentrations would return to preconstruction activities following completion of the project.

Avoidance of activities in an area within 660 feet of the bald eagle nest, particularly during the nesting season, is expected to minimize disturbances.

To deter colonial nesting water birds from establishing active nesting colonies in the construction areas, a Nesting Prevention Plan would be developed during PED in coordination with the USFWS and LDWF. If measures to prevent nesting of colonial nesting bird populations are not successful in the area, construction-related activities that would occur within 1,000 feet of a colony could be restricted to the non-nesting period, which in this region generally extends from September 1 to February 15, depending on the species present. This restriction would likely pose significant problems to construction activity schedules. If wading bird nesting colonies become established in the area, the 1,000 foot buffer must be maintained unless coordination with the USFWS indicates that the buffer zone may be reduced based on the species present or an agreement is reached with USFWS that allows a modified process to be adopted.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination.

For the proposed hurricane protection project, because all fill material would be dewatered, and because there are no known contamination issues in the vicinity of proposed borrow areas for mitigation project, there does not appear to be a reason to believe that material placement activities will exceed water quality criteria outside of the proposed mixing zone.

(2) Determination of Compliance with Applicable Water Quality Standards.

There does not appear to be a reason to believe that material placement activities will exceed water quality criteria outside of the proposed mixing zone; therefore, based on best available information, direct impacts from construction of the proposed project are expected to be in compliance with applicable water quality standards. As discussed in earlier sections (in particular, subparts II.b.(1)(g) and II.b.(1)(h)) and in Appendix A annex M of the EIS, there is a potential for impacts to water circulation which could affect dissolved oxygen and nutrient levels within protected side surface waters.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and private water supply.

The nearest surface drinking water intakes to the study area are located on the Mississippi River, which is hydrologically isolated from the study area by the Mississippi River levees. The proposed projects are therefore not expected to affect area drinking water resources.

g. Determination of Cumulative Effects on the Aquatic Ecosystem The proposed project would impact 9,757 acres of wetlands (Table 9). The required mitigation components can be found in Table 1.

Table 9. Impact to wetlands						
Habitat	Direct Impacts		Indirect Impacts		Total Impacts	
	Acres	AAHU	Acres	AAHU	Acres	AAHU
Swamp	1,112	595	8,432	495	9,544	1,090
Bottomland Hardwood	124	96	89	3	213	99
Total	***1,236***	***691.1***	***8,521***	***497.6***	***9,757***	***1,189***

The Wetland Value Assessment models indicate that the total net gain in AAHU derived from the proposed mitigation features will be 1,189 AAHU, while the total net loss resulting from all habitat impacts would be 1,189 AAHU. This demonstrates that the mitigation plan should fully compensate for the lost functions/values due to constructing and operating the WSLP project. An adaptive management plan is part of the mitigation plan Appendix A Annex M of the EIS.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem . The formulation of project plans and designs, evaluation of alternative plans, and development of operational scenarios for the tentatively selected plan, have all been conducted with the objective of minimizing potential negative impacts to the aquatic ecosystem. Placement of material excavated for construction of project features was designed in the context best management practices to reduce impacts also mitigation for any loss of functions and values of wetlands are part of the plans.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge

a. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation
No significant adaptations of the guidelines were made relative to this evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impacts on the Aquatic Ecosystem No practicable alternatives to the proposed discharges could be identified that would have less adverse impacts on the aquatic ecosystem.

c. Compliance with Applicable State Water Quality Standards Compliance with State Water Quality Standards will be achieved upon receipt of a water quality determination letter from the Louisiana Department of Environmental Quality. Chemical constituents of the dredged material released during dredging and disposal operations are not expected to exceed Louisiana Water Quality Standards.

d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act Compliance with applicable Toxic effluent standards under Section 307 will be achieved.

e. Compliance with the Endangered Species Act of 1973 The proposed action would not significantly adversely affect endangered or threatened species or their critical habitats.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972 The proposed action is compliant with specified protection measures for marine sanctuaries designated by the Marine

Protection, Research, and Sanctuaries Act of 1972. All disposal sites and effects are in inland waters. No effects would occur in ocean waters beyond the shoreline of the Gulf of Mexico.

g. Evaluation of Extent of Degradation of the Waters of the United States

(1) Significant Adverse Effects on Human Health and Welfare

(a) Municipal and Private Water Supplies. No effect on water supplies is expected.

(b) Recreational and Commercial Fisheries. No adverse effects on recreational and commercial fisheries are expected.

(c) Plankton. Plankton are expected to decrease in the immediate area of project construction operations due to increased turbidity. Adverse effects may linger for a period of time afterwards but would diminish as water clarity returns to preconstruction levels.

(d) Fish. The project will directly impact 1,112 acres of aquatic habitat. Fisheries are expected to shift and relocate outside the immediate area of project construction operations due to increased turbidity. Adverse effects may linger for a period of time afterwards but would diminish as water clarity returns to preconstruction levels. No adverse effects on fish populations are expected.

(e) Shellfish. No adverse effects on shellfish populations are expected.

(f) Wildlife. The project will directly impact 1,237 acres of wildlife habitat. The compensatory wetland mitigation will offset the impacts by providing wildlife habitat in the area. The levee will provide animals a place to escape high water events. No adverse effects on wildlife populations are expected.

(g) Special Aquatic Sites. No adverse effects on special aquatic sites. Mitigation is planned to compensate for impacts on the WMA, to wetlands, and vegetated shallows.

(2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems. There will be no significant adverse effects on life stages or other wildlife that is dependent on the aquatic ecosystem. The proposed action is expected to impact 1,112 acres of swamp habitats that provide an array of foraging, breeding, spawning, and cover habitat for a variety of adult and juvenile fishes, birds, mammals, and reptiles. The compensatory wetland mitigation would offset the impacts and provide habitat for juvenile fishes and invertebrates.

(3) Significant Adverse Effects on Aquatic Ecosystem Diversity, Productivity and Stability. The proposed action would enhance diversity by providing additional open water areas adjacent to the levee in certain areas. Those areas will provide shoreline edge for fish and wildlife resources. Productivity and stability of the aquatic ecosystems will decline during construction and equalize post construction. Mitigation will compensate for adverse effects.

(4) Significant Adverse Effects on Recreational, Aesthetic, and Economic Resources. No significant adverse effects on these resource is expected.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem. The formulation of project plans and designs, evaluation of alternative plans, and development of operational scenarios for the tentatively selected plan, have all been conducted with the objective of minimizing potential negative impacts to the aquatic ecosystem. Placement of material excavated for construction of project features was designed in the context best management practices to reduce impacts also mitigation for any loss of functions and values of wetlands are part of the plans.

i. On the Basis of the Guidelines, the Proposed Disposal Site(s) for the Discharge of Dredged Material (specify which) is or are (select one)

~~(1) Specified as complying with the requirements of these guidelines; or,~~

(2) Specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem; ~~or~~,

~~(3) Specified as failing to comply with the requirements of these guidelines.~~

IV. Evaluation Responsibility

a. Water Quality Input Prepared by: Eric Glisch

b. Project Description and Biological Input Prepared by: Mike Brown, Nathan Dayan

Review Responsibility

a. Water Quality Input reviewed by: David Ramirez

b. Project Description and Biological Input reviewed by: Sandra Stiles

May 5, 2014
Date

Joan M Exnicios
Joan M. Exnicios
Chief, Environmental Planning Branch

References

1. Conner, W.H., J.W. Day, and E.C. Pendleton. 1987. The Ecology of Barataria Basin, Louisiana: An Estuarine Profile. U.S. Fish and Wildlife Service Biological Report 85(7.13). http://www.nwrc.usgs.gov/techrpt/85-7-13.pdf. Last accessed on January 16, 2014.
2. Demcheck, D.K., R.W. Tollett, S.V. Mize, S.C. Skrobialowski, R.B. Fendick Jr., C.M. Swarzenski, and S. Porter. 2004. Water Quality in the Acadian-Pontchartrain Drainages, Louisiana and Mississippi, 1999-2001. U.S. Geological Survey Circular 1232. http://pubs.usgs.gov/circ/2004/1232/. Last accessed on January 16, 2014.
3. Departments of the Army and Air Force. 1983. *Drainage for Areas other than Airfields.* Army Technical Manual 5-820-4, Air Force Manual 885, Chapter 4.

http://armypubs.army.mil/eng/DR_pubs/dr_a/pdf/tm5_820_4.pdf. Last accessed on March 5, 2014.
4. Frederick, C.P. 2011. *Water-Quality Characteristics of Urban Storm Runoff at Selected Sites in East Baton Rouge Parish, Louisiana, February 2006 through November 2009*. U.S. Geological Survey Scientific Investigations Report 2011-5199. http://pubs.usgs.gov/sir/2011/5199/. Last accessed on January 15, 2014
5. Mielke, H.W., G. Wang, C.R. Gonzales, B. Le, V.N. Quach, and P.W. Mielke. 2001. *PAH and Metal Mixtures in New Orleans Soils and Sediments*. The Science of Total Environment 281(2001):217-227. http://faculty.rmu.edu/~short/research/gis/references/Mielke-HW-et-al-2001.pdf. Last accessed on March 5, 2014.
6. National Oceanic and Atmospheric Association (NOAA). 2008. *Screening Quick Reference Tables*. http://response.restoration.noaa.gov/sites/default/files/SQuiRTs.pdf. Last accessed on March 5, 2014.
7. Southwick, L.M., C.G. Brandon, T.S. Kornecki, and J.L. Fouss. 2002. *Potential Influence of Sugarcane Cultivation on Estuarine Water Quality of Louisiana's Gulf Coast*. Journal of Agricultural and Food Chemistry 50:4393-4399. https://afrsweb.usda.gov/SP2UserFiles/Place/64200500/csr/ResearchPubs/kornecki/kornecki_02a.pdf. Last accessed on January 16, 2014.
8. U.S. Army Corps of Engineers (USACE). 2010. *Louisiana Coastal Area (LCA) Ecosystem Restoration Study, Volume II of VI, Final Integrated Feasibility Study and Supplemental Environmental Impact Statement for the Amite River Diversion Canal Modification, Ascension and Livingston Parishes, Louisiana*. http://www.lca.gov/Projects/13/final_reports.aspx. Last accessed on March 5, 2014.
9. U.S. Army Corps of Engineers (USACE). 2013. *Programmatic Individual Environmental Report #36, Lake Pontchartrain and Vicinity Hurricane Storm Damage and Risk Reduction Mitigation, Orleans, Plaquemines, St. Bernard, St. Charles, St. John the Baptist, and St. Tammany Parishes, Louisiana*. http://www.nolaenvironmental.gov/projects/usace_levee/IER.aspx?IERID=36. Last accessed on March 5, 2014.
10. U.S. Department of Agriculture (USDA). 1973. *Soil Survey, St. James and St. John the Baptist Parishes, Louisiana*. http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/louisiana/stj-stjbLA1973/StJ-StJB.pdf. Last accessed on January 13, 2014.
11. U.S. Department of Agriculture (USDA). 2009. *Soil Survey of St. John the Baptist Parish, Louisiana*. http://soildatamart.nrcs.usda.gov/manuscripts/LA095/0/stjohn.pdf. Last accessed on January 13, 2014.
12. U.S. Department of Agriculture (USDA). 1987. *Soil Survey of St. Charles Parish, Louisiana*. http://soildatamart.nrcs.usda.gov/manuscripts/LA089/0/la_st.charles.pdf. Last accessed on January 13, 2014.
13. U.S. Department of Agriculture (USDA). 1991. *Soil Survey of Livingston Parish, Louisiana*. http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/louisiana/LA063/0/livingston_a.pdf. Last accessed on March 5, 2014.
14. U.S. Department of Agriculture (USDA). 2014. *Web Soil Survey*. http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. Last accessed on March 7, 2014.
15. U.S. Geological Survey (USGS). 1993. *Louisiana GAP Analysis Project*. http://sdms.cr.usgs.gov/gap/gap2.html. Last accessed on March 7, 2014.
16. U.S. Environmental Protection Agency (USEPA). 2012. *Stormwater Pollution Prevention Plans for Construction Activities*. http://cfpub.epa.gov/npdes/stormwater/swppp.cfm. Last accessed on January 16, 2014.

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex B

Louisiana Coastal Resources Program Consistency Determination

Throughout this Annex the term "nonstructural" is used to describe the following elements; berms, flap gates on the roadway, raising of homes and flood proofing of individual structures. In the main report these elements are identified as localized storm surge risk reduction measures in St. James Parish. There has been no change in the impact area of these element. The name has only changed for this portion of the final recommendation.

BOBBY JINDAL
GOVERNOR

STEPHEN CHUSTZ
SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL MANAGEMENT

May 15, 2014

Joan Exnicios
Chief, Environmental Planning Branch
Corps of Engineers- New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

RE: **C20140059,** Coastal Zone Consistency
New Orleans District, Corps of Engineers
Direct Federal Action
West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction System Feasibility Study
St. Charles, St. John the Baptist, and St. James Parishes, Louisiana

Dear Ms. Exnicios:

The above referenced project has been reviewed for consistency with the Louisiana Coastal Resources Program in accordance with Section 307 (c) of the Coastal Zone Management Act of 1972, as amended. Although this Office has some reservations about the sustainability of the proposed mitigation features, the project, at the feasibility stage described in this application, is consistent with the LCRP.

The Office of Coastal Management looks forward to continued participation in the planning of this project, and further consistency review when the construction phase is reached. If you have any questions concerning this determination please contact Jeff Harris of the Consistency Section at (225) 342-7949.

Sincerely,

Don Haydel
Acting Administrator
Interagency Affairs/Field Services Division

DH/jdh

cc: Nathan Dayan, COE-NOD
Dave Butler, LDWF
Kirk Kilgen, OCM
Craig Leblanc, OCM

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

March 27, 2014

Regional Planning and
Environment Division South

Mr. Don Haydel
Acting Administrator
Louisiana Department of Natural Resources
Interagency Affairs, Compliance, and Field Services Division
P.O. Box 44487
Baton Rouge, LA 70804-4487

Dear Mr. Haydel:

The U.S. Army Corps of Engineers prepared a draft Environmental Impact Statement (DEIS) for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction study. The purpose of this study is to provide, consistent with Congressional authorizations, hurricane and storm damage risk reduction for St. Charles, St. John the Baptist and St. James Parishes that would be economically and environmentally justified. We request your concurrence with the enclosed Consistency Determination, which addresses the applicable Coastal Use Guidelines.

The recommended plan presents potential solutions to reduce damages from hurricane and tropical storm surge for 62,900 residents in St. Charles, St. John the Baptist and St. James Parishes. The proposed action addresses flooding caused by storm surge but does not address rainfall flooding. The tentatively selected risk reduction system for the WSLP study includes the construction of an 18.27-mile (96,481 ft) levee system around the communities of Montz, Laplace, Reserve and Garyville (Alternative C). It also includes the construction of nonstructural components in St. James Parish, including 3 polder berms and 146 flood control culverts under LA Highway 3125. The recommended structural and non-structural features, as well as the associated compensatory mitigation plan are considered constructible at their current level of design.

The structural features were located to minimize, to the maximum extent practicable, project-induced wetland impacts by locating project features parallel and adjacent to existing oil and gas pipeline rights-of-way to minimize segmentation of wetland areas and systems. However, if the proposed project were implemented, there would be a direct removal of 1,112 acres of swamp and 123 acres of BLH habitats. In addition to the direct removal of habitat with the constructed features, the project would enclose 8,432 acres of swamp and 455 acres of BLH.

These unavoidable impacts would be mitigated through the implementation of the mitigation plan, which proposes to offset 1,189 Average Annual Habitat Units (AAHU) that would be lost due to the implementation of the selected plan. Impacts to swamp habitat would account for approximately 1,089 of these AAHUs and impacts to BLH would account for the remaining 99 AAHUs. Seven mitigation plan components are proposed to compensate for these impacts. These include the mitigation of approximately 99 AAHUs of BLH and 121 AAHUs of swamp in the

Bonnet Carré Spillway, approximately 407 AAHUs of swamp at the Maurepas Crawfish Ponds Restoration site, approximately 339 AAHUs of swamp at the Blind River Swamp Restoration site, approximately 131 AAHUs of swamp at the Milton Island Swamp Restoration site, approximately 20 AAHUs of swamp at the Lutcher Polder Farmlands Swamp Restoration site, and the purchase of sufficient credits to offset 72 AAHUs of swamp mitigation credits from an approved mitigation bank in the Pontchartrain Basin.

Since project impacts were avoided and minimized to the maximum extent practicable, and a mitigation plan is proposed that would compensate for all unavoidable impacts to wetland resources, the proposed action is consistent with the Louisiana's Coastal Resources Program's Consistency Guidelines. Please review the enclosed documents and provide concurrence as soon as possible but within 45 days of the date of this letter. Please contact Daniel Sumerall at 601-631-5428 if questions arise.

Sincerely,

Sandra Stiles

for Joan M. Exnicios
Chief, Environmental Planning Branch

Updated LOUISIANA COASTAL RESOURCES PROGRAM CONSISTENCY DETERMINATION

WEST SHORE LAKE PONTCHARTRAIN HURRICANE AND STORM DAMAGE RISK REDUCTION FEASIBILITY STUDY

St. Charles, St. John the Baptist and St. James Parishes, Louisiana

1.0 INTRODUCTION

Section 307 of the Coastal Zone Management Act of 1972, 16 U.S.C. 1451 et. seq., requires that "each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with state approved management programs." In accordance with Section 307, the US Army Corps of Engineers (USACE), New Orleans District (CEMVN) has prepared this Consistency Determination the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study. Coastal Use Guidelines were written to implement the policies and goals of the Louisiana Coastal Resources Program and to serve as a set of performance standards for evaluating projects. Compliance with the Louisiana Coastal Resources Program and, therefore, Section 307, requires compliance with applicable Coastal Use Guidelines.

2.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of this study is to provide, consistent with Congressional authorizations, hurricane and storm damage risk reduction for St. Charles, St. John the Baptist and St. James Parishes that would be economically and environmentally justified. The U.S. Congress recognized the need for a hurricane and storm damage risk reduction project in the area. Two Congressional resolutions authorize this study. The first was adopted on July 29, 1971 by the U.S. House of Representatives Committee on Public Works.

> *"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Lake Pontchartrain and Vicinity, Louisiana, published as House Document No. 231, 89th Congress, First Session, and other pertinent reports, with a view to determining whether modifications to the recommendations contained therein are advisable at this time, with particular reference to providing additional levees for hurricane protection and flood control in St. John the Baptist Parish and that part of St. Charles Parish west of the Bonnet Carré Spillway."*

The U.S. Senate Committee on Public Works adopted a resolution on September 20, 1974.

> *"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, that the Board for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Lake Pontchartrain and Vicinity, Louisiana, published as House Document No. 231, 89th Congress, First Session, and other pertinent reports, with a view to determining whether modifications to the recommendations contained therein are advisable at this time, for hurricane protection and flood control in St. James Parish."*

The study was first funded in the 1980s. A 1985 Reconnaissance Report found that there was no justified structural plan suitable for Federal participation. A 1987 reconnaissance report

indicated that under Federal criteria a solution could not be found that would be economically justified or environmentally acceptable. Because of increasing population and economic activity, a 1997 reconnaissance report indicated that the study should proceed into feasibility phase. A Feasibility Cost Share Agreement was executed with the Pontchartrain Levee District (PLD) in 1998. The study stopped in 2002. Following Hurricane Katrina, renewed interest by the levee district led to an amended agreement in 2008. Planning for the project was underway when Hurricane Isaac hit in August 2012. President Obama traveled to Laplace, Louisiana after the storm to view the damage and visit with residents and local leaders (Figure 1-6). The President said, "We're getting on the case to figure out what happened here and what we can do to make sure it won't happen again." The USACE's post-Isaac damage assessment met the first part of the President's commitment. This project would help deliver the second part.

The proposed plan addresses flooding caused by storm surge but does not address rainfall flooding. There have been significant changes over the last 40 years, especially since Hurricane Katrina. Population has grown over the past few decades. Storm surge flooding damages homes, businesses and infrastructure. Surge travels from the Gulf of Mexico into the basin and floods the three study area parishes and beyond. Since 1855, 70 hurricanes have made landfall within 65 nautical miles of Laplace. Hurricanes Betsy (1965), Camille (1969), Juan (1985), Andrew (1992), Katrina and Rita (2005), Gustav and Ike (2008), and Isaac (2012) caused storm surge flooding. Hurricane Isaac's surge, measured from 6 to 8 feet in the area, threatened lives and damaged more than 7,000 homes, closed roads and disrupted the Nationally-significant energy industry. Businesses and workers serving the Port of South Louisiana are located in the area. The port is the largest volume port in the Western Hemisphere and the ninth largest in the world. It stretches 54 miles on the Mississippi River between New Orleans and Baton Rouge. Hurricane Isaac disrupted port logistics. Its storm surge blocked facility access closing the port. Oil refineries, including the Nation's third largest, were shut down. Gasoline production stopped. Regional and National fuel prices spiked. The storm caused extensive agricultural losses due to an inability to drain storm surge water from fields.

3.0 DESCRIPTION OF THE PROPOSED ACTION

The recommended plan includes the construction of an 18.27-mile levee system around the communities of Montz, Laplace, Reserve and Garyville. The plan also includes the construction of nonstructural components in St. James Parish. An overview of the entire risk reduction system is shown on figures 1, 2 and 3.

Levee System

The levee system would begin at the upper guide levee of the Bonnet Carre Spillway, north of an underground utility pipeline right of way and US-61. The levee would head northwest paralleling the pipeline right of way and pass under I-10. Past I-10 the levee would enclose the I-10 and I-55 interchange and cross US-51. It would then track north of I-10 and a pipeline transmission corridor. Past the Belle Terre/I-10 exit, the levee would pass back under I-10 and parallel the pipeline corridor through wetlands until it crosses Hope Canal. The levee would then turn south; cross the pipeline transmission corridor and then extend to the Mississippi River Levee System (MRL)

The levee system would reduce the risk of flooding for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 could allow for an earlier re-entry

Figure 1: Overview Map Including Mitigation Areas

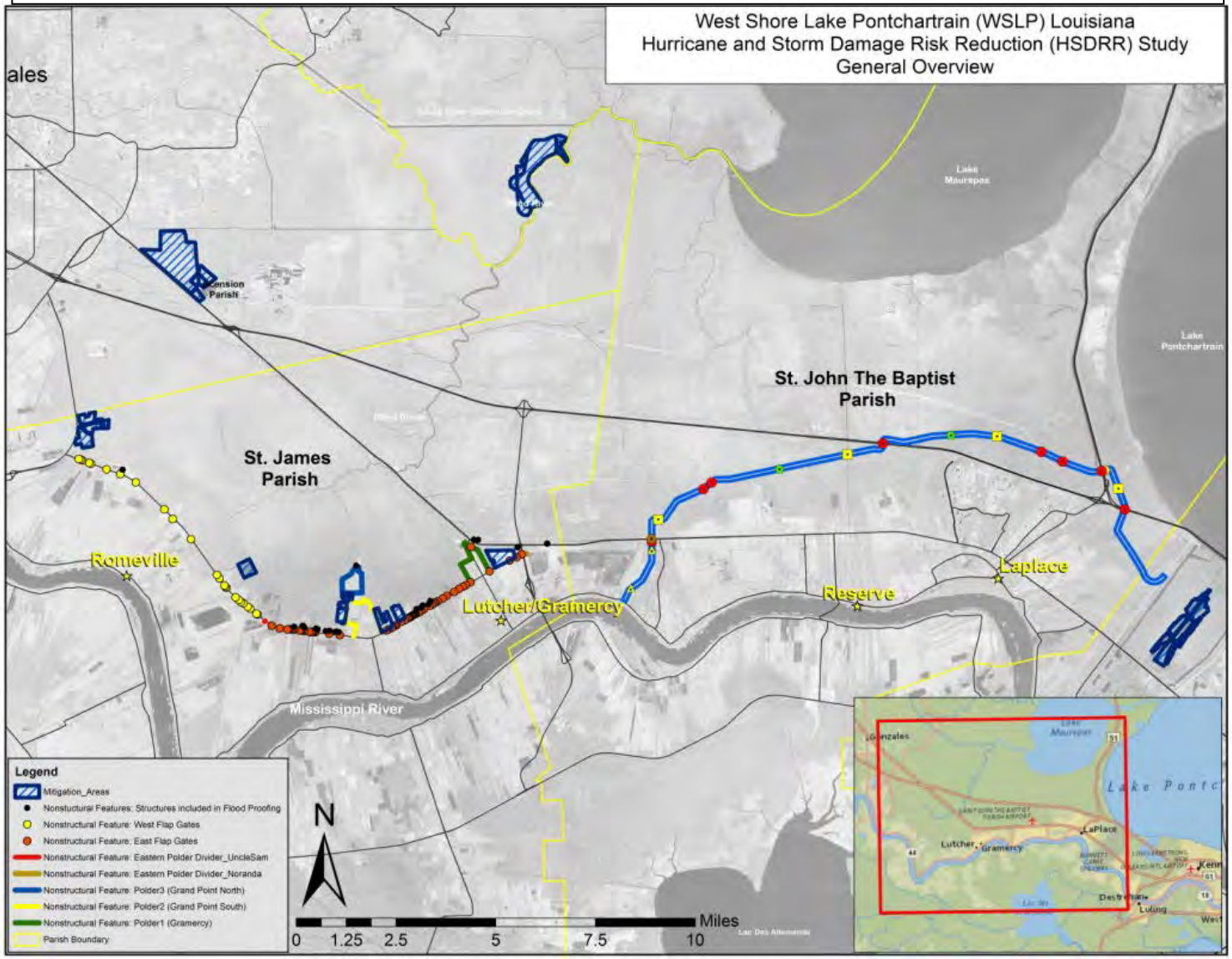


Figure 2: Structural Componet - Levee

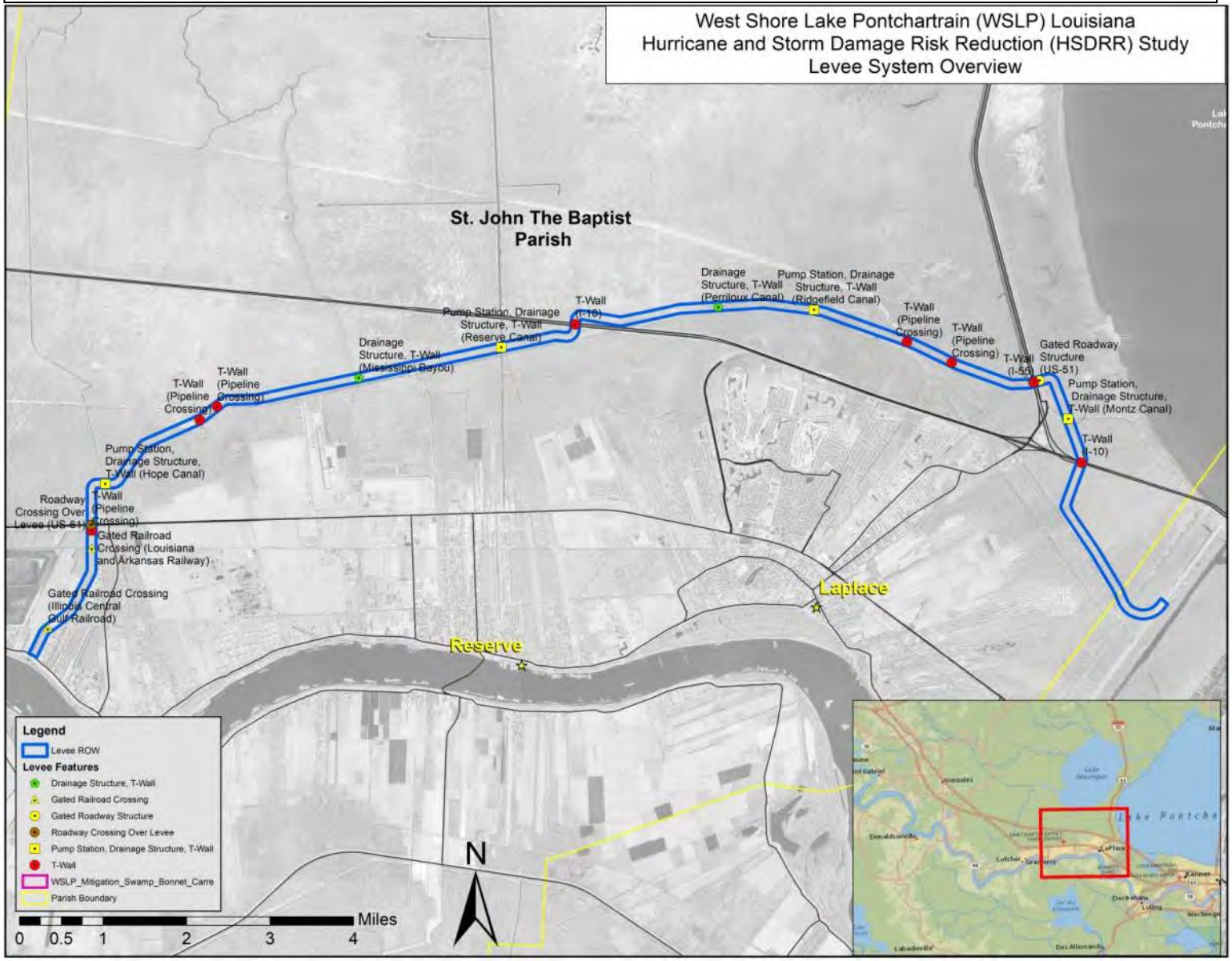
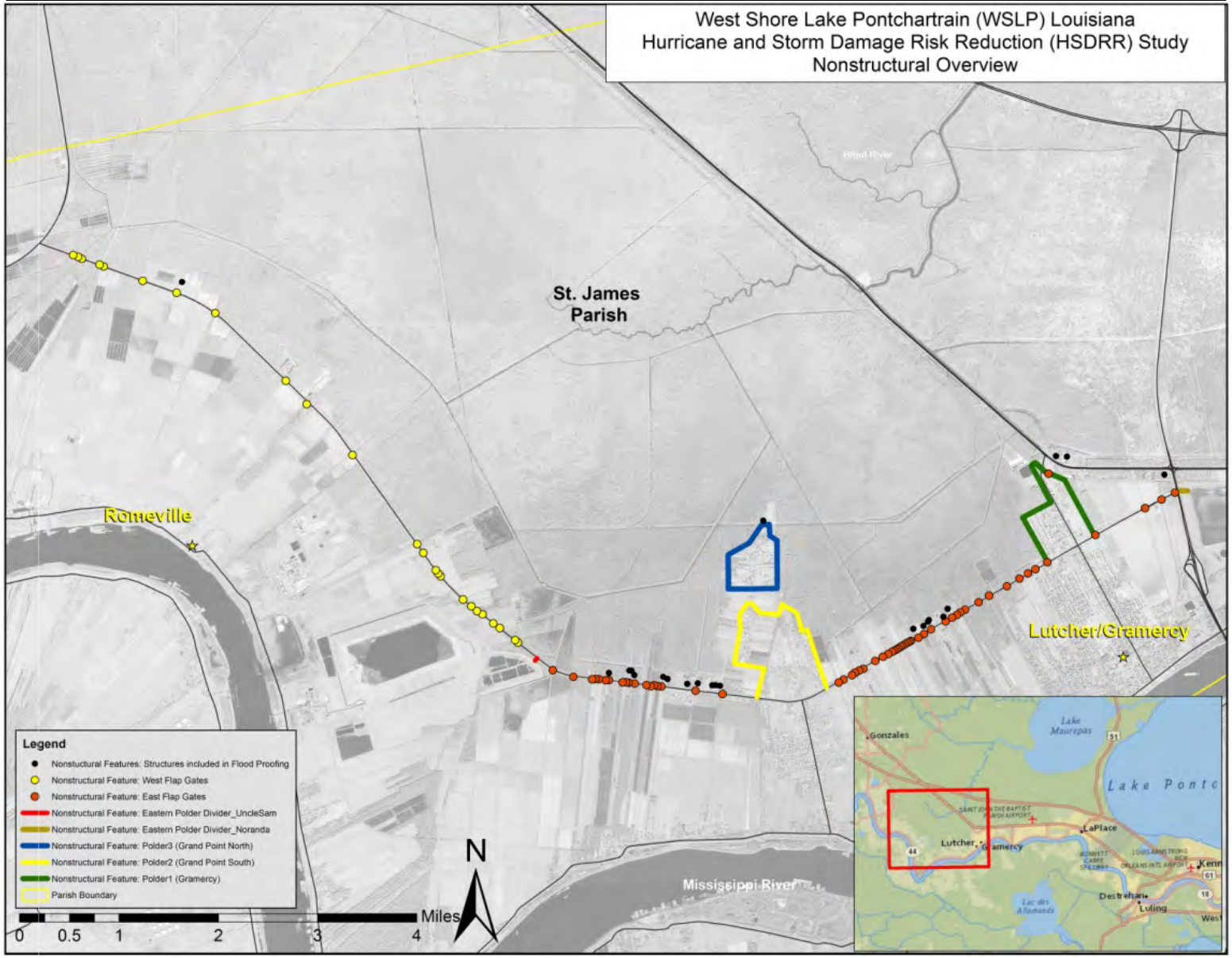


Figure 1: Non-Structural Componet



route for residents and emergency responders in southeast Louisiana, including residents in the New Orleans metropolitan area.

The construction of the structural component of the project, hereafter referred to as the “levee system”, would be based on a 1% probability storm level of risk reduction and a 2020 intermediate RSLR condition. In order to maintain the 1% probability storm level of risk reduction system over the period of evaluation (50 yrs) the levee system would include future levee lifts based on the 2070 intermediate RSLR conditions. For example, at the starting point of the upper guide levee of the Bonnet Carre Spillway the levee would be constructed to a top of levee elevation of 15 ft NAVD 88 in 2020. In the future, the levee at this point would be lifted to a final elevation of 19.5 ft NAVD 88 based on the 2070 intermediate RSLR conditions. This is the highest elevation point of the constructed levee system. The levee would start at this height and taper down to a final top levee elevation of 8.5 ft NAVD 88 near the MRL. The final 2070 top levee elevation near the MRL would be 16 ft NAVD 88.

The system would consist of earthen levees, floodwalls (T-Walls), floodgates, drainage canals, a flood-side ditch for hydraulic connectivity for wetlands north and south of the system, drainage structures and pump stations along the alignment, and mitigation measures (Figure 5-2). Structures through the levee would be built to the 2070 intermediate RSLR condition, to prevent costly future retrofits required for anticipated changing sea levels.

Starting at the upper guide levee of the Bonnet Carre Spillway and heading west along levee the project would construct a 646 linear foot (hereafter “LF”) T-Wall to pass under the existing I-10 overpass. Past this point, an 1100 c.f.s. pump station with three 68" outfalls would be built at Montz Canal, which is very near the I-55 northbound entrance ramp. The pump station, when the system is closed, would mainly remove rainwater flows from the Woodland, the River Forest, and the Prescott Canals. A 267 LF T-Wall and two 6' x 18' x 27' gated drainage structures would also be constructed at this location. This location and all locations with pump stations or drainage structures would be connected to a flood side ditch and a protected side canal that would parallel the entire levee length. The canals would be used to maintain the existing connection between swamps located inside and the swamps outside the levee system. The protected side canal would also serve as a redundancy connection if one of the pump stations failed during an event.

Past the Montz Canal, at the location of US-51, a 188 LF gated structure would be placed through the levee. Directly west of US-51, a 247 LF T-Wall would cross under I-55. The levee would continue to the west until the levee intercepts the first pipeline crossings near Vicknair Canal. Two sections of T-Walls would be used for these pipeline crossing, a 550 LF T-Wall, and a 623 LF T-Wall. Half of the 35 required pipeline relocations would be at these two locations. For purposes of this report, it is expected that all of the pipeline relocations would be compensable. Relocations are expected to take place in the proposed levee right of way (ROW) or existing pipeline ROW. Determination of the compensability of these relocations will be determined during the engineering and design phase of this project if it is authorized.

Continuing west, the levee would then cross Ridgefield Canal. Ridgefield Canal is located between the I-10 LADOT weigh station and the I-10/LA 3188 exit. A 200 c.f.s. pump station with three 30" outfalls would be built at Ridgefield Canal. The pump station, when the system is closed, would mainly remove rainfall flows from Laplace Plantation, Perriloux, Ridgefield, Tebo and Vicknair canals. A 244 LF T-Wall and with two 6' x 18' x 267' gated drainage structures would also be constructed at this location.

West of the Ridgefield Canal, a 100 LF floodgate would be constructed at the location of the Perriloux Canal to allow rainfall flows to flow through the levee when the system is not closed.

West of the I-10/LA 3188 exit, a 247 LF T-Wall would be constructed to cross back under I-10. The levee would continue to parallel the pipeline corridor through wetlands until it reaches Reserve canal. A 400 c.f.s. pump station with three 48" outfalls would be built at this location. The structure at this location would also include two 6' x 20' x 25' drainage structure with a boat bay and 335 LF of T-Walls. Small boats would still be able to pass through the drainage structure when the system is open.

Continuing west, the levee would then cross Mississippi Bayou. A 6' x 10' x 25' drainage structure with a 267 LF T-Wall would be constructed at this location.

The levee would then continue west toward Hope Canal, until it reaches the next major set of pipeline crossings. All of the remaining major pipeline relocations would be at this location. Two sections of T-Walls would be used for these pipeline crossing, a 400 LF T-Wall, and a 300 LF T-Wall. As with the other pipelines, for purposes of this report, it is expected that the pipeline relocations would be compensable. Relocations are expected to take place in the proposed levee ROW or existing pipeline ROW at this location. Determination of the compensability of these relocations will be determined during the engineering and design phase of this project if it is authorized.

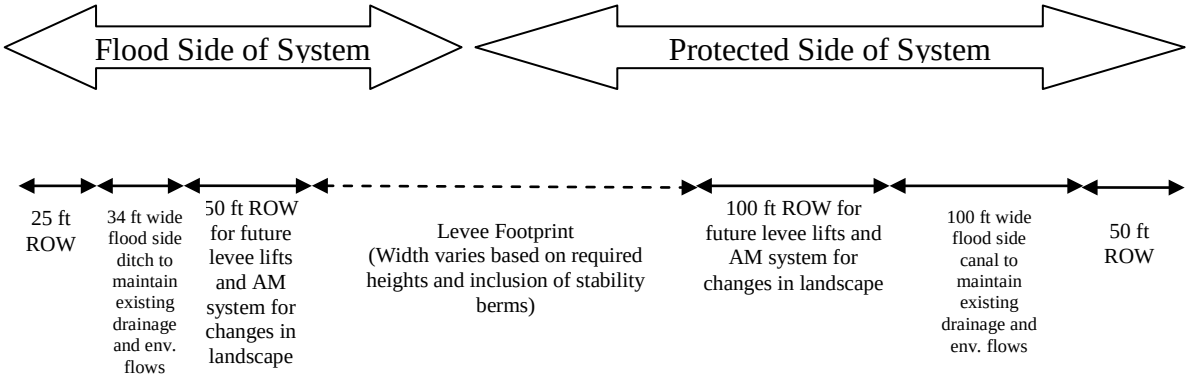
The levee would then continue west until it reaches Hope Canal. A 450 c.f.s pump station with three 54" outfalls would be constructed at this location. Currently the design and cost includes a 6' x 20' x 25' drainage structure and a 247 LF T-Wall, but the Hope Canal location is also the same location of the State of Louisiana's proposed Mississippi Reintroduction into Maurepas Swamp diversion. The WSLP project has been coordinating activities between the project development teams, but for the purposes of the WSLP feasibility design, we do not consider the diversion project as a future landscape feature, since the State has not identified funding and has filed an incomplete permit application to the USACE for construction of the project. The USACE would continue to monitor the status of the diversion project. The team expects that if the diversion project moves forward it would be constructed on the flood side of the levee and would parallel the levee from Hope Canal to the MRL.

When the levee turns south, past Hope Canal to tie into the MRL, the levee would cross US-61, a pipeline ROW, and two railroad tracks. US-61 would be raised to hump over the levee at the crossing point. The pipeline crossing would include a 301 LF T-Wall, while the two railroad crossings would include a 150 LF gate structure and a 50 LF gate structure.

In all, there would be a total of 5,001 LF of T-Walls, 4 pump stations with associated drainage structures, 2 drainage structures, one gated road crossing, and 2 gated railroad crossings.

4.69 miles of the upper guide levee of the Bonnet Carre Spillway from the spillway control structure to the WSLP tie-in point would be included in the WSLP levee system, but there would be no construction activities associated with this Bonnet Carre levee. Existing levee heights are high enough to prevent 1% probability storm surge from entering the WSLP system during storms. The construction of the WSLP tie-in point would be to set to elevation of 15 ft NAVD 88 while the current upper guide levee elevation is 15.5 ft NAVD 88. The upper guide levee heights in the future would be monitored to determine if sections of the Bonnet Carre Spillway levee would need future lifts to prevent overtopping of storm surges into the WSLP system.

All levee right of ways would have the following typical dimensions:



The 50 ft and 100 ft right of ways adjacent to the levee footprints would be used for future levee lifts. The levee would be lifted five times overthe period of evaluation.. The first two lifts would be used to obtain a 1% probability storm level of risk reduction system in 2020. Additional levee lifts to maintain a 1% probability storm level of risk reduction system would take place in years 2030, 2045, and in 2060.

9,000,000 million cubic yards (cy) of compacted fill and un-compacted fill would be required to create and maintain the levee over the period of evaluation. A portion of the initial fill material, if suitable, would be obtained from the canals and ditch, approximately 1,678,000 cy. Borings indicate that the top 4 ft of the cross section of these features would not be suitable as levee fill material. The top 4 ft of material; approximately 1,685,000 cy, would be used beneficially at mitigation plan sites, or disposed appropriately by the contractor. The remaining fill for the levee, approximately 7,322,000 cy, would be obtained from the Bonnet Carre Spillway.

The levee footprint would vary based on the designed cross section and required top of levee heights by each levee section. The top of the levee would have a 10’ wide crown and the protected side of the levee system would be based on a 1:3 side slope, with some reaches including a geotechnical stability berm. 3,400,000 square yards of geotextile fabric would be placed under the levee footprint and approximately 80,000 cubic yards of aggregate limestone would be used to build a road on the levee crown.

The total levee construction ROW would be 1,235 acres. RE agreements would be acquired on all features. A perpetual flood protection levee easement would be acquired for the 669 acres of the levee and floodwall features. A perpetual underground piling easement would be acquired for the 33 acres of the T-Walls. For the two canals, a 519 acres perpetual drainage ditch easement would be acquired. The remaining features the 4 pump stations; 9 acres and the 3 gated crossing; 5 acres would be acquired based on fee, excluding minerals. In addition to the permanent easements, 49 acres of temporary access easements and 12 acres of temporary work area easements would be acquired. These temporary access and work access areas would be on existing roadways or developed areas of the project area and would not be in environmentally sensitive areas.

All of the impacts from the constructed features would be to either swamp habitats or BLH. There would be a direct removal of 1,112 acres of swamp habitats and 123 acres of BLH habitats. Using a wetland value assessment under the intermediate sea level scenario the project would be required to mitigate for a direct loss of 595.3 average annual habitats units (AAHUs) of swamp and 95.5 AAHUs of BLH. In addition to the direct removal of acres of habitat due to construction, the project would enclose 8,432 acres of swamp and 89 acres of BLH.

Hydrologic connectivity would be maintained to the extent practicable through water control structures except during closure for hurricanes or tropical storms. When the system is closed, pumps would operate on average for 1.7 storms per year, which equates to a closure of structures on average 8.5 days per year. This expected rate of closure would be the same regardless of the actual rate of RSLR as closure of the system is tied to tropical storm events and the elevation trigger would be adjusted as sea level rises. The risk reduction system is only authorized to address storm surge caused by hurricane and tropical storm events. It is not authorized to mitigate for or reduce impacts caused by higher day-to-day water levels brought about by increases in sea level rise. Any operational changes implemented to address changing SLR conditions or for any other non-project-related purpose would be considered a separate project purpose requiring separate authorization, new NEPA documentation, and/or permit approvals.

The levee is designed to maintain hydrologic connectivity to the extent practicable. In order to minimize a reduction in efficiency of drainage affecting water quality and increased impoundment on the protected side of the system, the levee design includes drainage structures and canals located on both the flood side and protected side of the levee. In order to mitigate for any impacts caused by the potential delay in water movement, the team developed a WVA that accounts for delays in water movement. Because 366 acres of the total 455 acres of enclosed BLH is already impacted by existing roadways and railroad tracks, the BLH indirect impacts were calculated to total 89 acres. Using a WVA under the intermediate RSLR scenario, the project would have to mitigate for the indirect loss of 494.5 AAHUs of swamp and 3.1 AAHUs of BLH. The project would also be required to mitigate for a direct loss of 595.3 AAHUs of swamp and 95.5 AAHUs of BLH. The total required mitigation for both the direct and indirect impacts from the construction of the risk reduction levee system is 1,188.03 AAHUs.

Nonstructural System

The recommended plan includes nonstructural measures for structures in the communities of Gramercy, Lutcher and Grand Point which are located outside of the proposed levee system (Figure 5-2). See Chapter 3 for information concerning plan formulation. The nonstructural measures include nonstructural berms, and flapgates on existing drainage and roadway features. Flood proofing measures (e.g. raising of structures) are limited to a few structures located outside of the larger nonstructural measures. All of the measures focused on providing a risk reduction above the 1% AEP storm stages in 2020. NFS will be required to maintain the non-structural features to their initial design height for so long as the project remains authorized Future level of risk reduction is dependent on the rate of sea level rise.

Gramercy Area

In the Gramercy area, north of Hwy 3125, a 10,100 LF nonstructural berm would be built to provide risk reduction to 275 structures, herein referred to as "**Polder 1 (Gramercy Berm)**." The berm would be constructed to a +6.5' NAVD 88 elevation. The berm in 2020 would provide risk reduction above the 1% AEP storm stages. Storm stages in St. James Parish are below +6.5'

NAVD 88 elevation in 2020. As discussed in Chapter 3, in the future, the berm's effectiveness depends on the RSLR. .

The berm would parallel both sides of HWY 20, and parallel the railroad track along US-61 (Airline Highway). On the south, the berm would tie into Hwy 3125 to close off the system. Hwy 3125 is key feature for all of the nonstructural features. The entire roadway is above a 6.5 ' NAVD 88 elevation and will be used as a tie in point for the berm. The design of the berm is based on with a 4' wide crown and 3:1 side slopes. Using local LIDAR data it was assumed that the existing ground elevation under the berm would be at an elevation of approximately 4.3 ft NAVDD88. Using this assumption, the proposed berm would have an average height of 2.2 ft with an average width of 18 ft, and require 237,000 cy of compacted fill for construction. The berm would also include two floodgates to allow existing drainage to flow through the berm when not under surge events. A pump system to operate and remove rainwaters during tropical/hurricane storm events will be included in the features. The pump system will be approximately 217 cfs. The berm would be placed in a location so as not to interfere with existing local drainage.

In reviewing, the berm footprint there is a risk of affecting approximately 0.29 acres of forested wetlands. Attempts would be made to avoid these areas during construction. Due to the current uncertainty in avoiding these areas, we have included cost for mitigating for these forested wetlands in the total construction cost.

Grand Point Area

In the Grand Point area, north of Hwy 3125, the recommended plan includes two nonstructural berms, "**Polder2 (Grand Point South)**" and "**Polder3 (Grand Point North**)".

Polder2 (Grand Point South) would reduce risk for 190 structures. The berm would be 14,488 LF, and would include a 4' wide crown and 3:1 side slopes. Similar to the Gramercy berm, it would tie into HWY 3125 and be constructed to a 6.5' NAVD 88 elevation. Initially, in 2020 the berm would provide risk reduction above the 1% AEP storm stages. Storm stages St. James Parish are below a 6.5' NAVD 88 elevation in 2020. Future level of risk reduction is dependent on the rate of sea level rise.

Using LIDAR data it was assumed that the existing ground elevation under the berm would be approximately 4.5' NAVD 88. Using this assumption the proposed berm would have an average height of 2 ft with an average width of 16 ft, and require 273,900 cy of compacted fill for construction. The berm would also include one floodgate to allow existing drainage to flow through the berm when not under surge events. A pump system to operate and remove rain waters during tropical/hurricane storm events will be included in the features. The pump system will be approximately 382 cfs. The berm would be placed in a location so as not to interfere with existing local drainage. The berm would also be placed very near the edge of the property owners' parcels where feasible. This would minimize the loss of use of any property.

Polder3 (Grand Point North) would provide risk reduction to 71 structures. The berm would be a complete ring around the structures in the northern portion of Grand Point, near the Grandpoint Boat Lunch. The berm would be 10,400 LF, and would include a 4' wide crown and 3:1 side slopes. The berm would be constructed to a 6.5 ' NAVD 88 elevation. Initially, in 2020 the berm would provide risk reduction above the 1% AEP storm stages. Storm stages St. James Parish are below a 6.5' NAVD 88 elevation in 2020. Future level of risk reduction is dependent on the rate of sea level rise.

Using local LIDAR data it was assumed that the existing ground elevation under the berm would be approximately 4‘ NAVD 88. Using this assumption, the proposed berm would have an average height of 2.5 ft with an average width of 20 ft, and require 286,800 cy of compacted fill for construction. The berm would also include one floodgate to allow existing drainage to flow through the berm when not under surge events. A pump system to operate and remove rain waters during tropical/hurricane storm events will be included in the features. The pump system will be approximately 140 cfs. The berm would be placed in a location so as not to interfere with existing local drainage. The berm would also be placed very near the edge of the property owners’ parcels where feasible. This would minimize the loss of use of any property.

In reviewing, the berm footprint there is a risk of affecting approximately 0.81 acres of forested wetlands. Attempts would be made to avoid these areas during construction. Due to the current uncertainty in avoiding these areas, we have included cost for mitigating for these forested wetlands in the total construction cost.

Flood Risk Reduction Under LA Highway 3125

In addition to the nonstructural berms north of Hwy 3125, the recommended plan is to use 13 miles of Hwy 3125 and its existing foundation as nonstructural feature. Currently the roadway elevation is above a 6.5' NAVD 88 elevation. Currently, the 1% AEP storm stages in 2020 flow through the culverts under the roadway in the opposite direction from natural drainage. By closing off the culverts with one-way flap gates and a drainage canal with a floodgate during surge events, the plan would provide risk reduction to 19,500 acres and 4,295 structures south of Hwy 3125. Although there are a limited number of structures that are impacted by the 1% AEP storm surge stages, this closure reduce the risk of a large portion of the parish’s critical sugarcane crops from flooding from this type of storm surge event. If the parish in the future makes improvements to Hwy 3125, any additional height added to the entire highway would add to the structures risk reduction level behind the hwy. Due to the fact that the roadway is being used as flood risk reduction feature the local sponsor will be required to maintain the system’s initial level of risk reduction. This includes the berm tie in points to the roadway and 13 miles of the roadway. If the roadway requires maintenance and would be degraded below its original elevation, the work should take place outside of hurricane season. If it is not possible to workout side of hurricane season, interim flood risk measures should be set up to maintain the original level of risk reduction provided by the roadway.

The recommended plan includes 145 flap gated closures, two floodgates and two small berms (Noranda and Uncle Sam). The Noranda berm ties the highway into high ground east of Gramercy. The Uncle Sam berm divides the developed area behind Hwy 3125 from an area that is primarily agricultural land. By dividing these two areas, the local community can focus its reduction effort in the future. Future improvements could be focused on sections of the hwy that have structures behind the hwy, approximately 7 miles vs. 13 miles. The area west of the Uncle Sam berm includes an area of 8,175 acres, but only includes one structure that is has a first floor elevation below the 1% the AEP storm stages. The total length of the berms is approximately 645 LF.

Due to the nature of the flooding south of Hwy 3125, it is assumed that the 19,500 acres would have ample storage capacity to hold any rainfall during the surge events. Even if some acres of crops are flooded from rainfall it would be much less than if the surge was allowed to flow under Hwy 3125.

Remaining Structures in St. James Parish

The recommended plan addresses the flooding of structures located outside of the polders north of Hwy 3125. Eighty structures would be outside of the nonstructural berms. Only 23 of the 80 structures have a first floor elevation less than the 1% AEP storm stages in 2020. Based on this evaluation the recommended plan includes 14 residential structures that would be raised to the stage associated with the 2070 1% (100-year) AEP event; 4 non-residential structures would be flood proofed to 3 feet above the ground elevation; and smaller nonstructural berms would be constructed for 5 light industrial/warehouse facilities. The 14 residential structures are being raised to the 2070 height because it is more cost effective to raise a home once.

Mitigation Plan

The objective of the mitigation plan is to restore swamp and bottomland hardwood habitat to fully compensate for unavoidable project-induced impacts. WVA models were run on the recommended WSLP levee and non-structural footprints to determine the functions and values of the impacted habitats, expressed in Average Annual Habitat Units (AAHU). The models predict that approximately 1,189 AAHUs would be lost due to direct and indirect habitat impacts over the 50-year period of analysis. See Mitigation Plan for Details.

Table K-1. Wetland habitat impacts.

Habitat	Direct Impacts		Indirect Impacts		Total Impacts[1]	
	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs
Swamp[2]	1,112	595	8,432	495	9,544	1,090
Bottomland Hardwood	124	96	89	3	213	99
Total	***1,236***	***691.1***	***8,521***	***497.6***	***9757***	***1,189***

Six mitigation plan components will provide the required compensation for habitat impacts.

The first feature mitigates for BLH impacts through the construction of a project that creates BLH in the Bonnet Carré Spillway.[3]Further information about the mitigation measures that are being proposed to offset the unavoidable project-induced impacts from the WSLP project are provided in the attached draft mitigation plan (Attachment 1).

- **Five components collectively compensate for Project swamp impacts. The components are:**
  - **Purchasing credits from a swamp mitigation bank (available at this time High Point Phase 1, Timberton Phase 2 and 3)**
  - **Blind River Diversion Canal Swamp Restoration[4]**

[1] Figures are rounded up.
[2] Includes 1.1 acres of impacts from non-structural features.
[3] This plan was developed as an alternative considered in the Lake Pontchartrain and Vicinity Hurricane and Storm Damage Risk Reduction System, Programmatic Individual Environmental Report for mitigation. This alternative was not recommended. U.S. Army Corps of Engineers, 2013. Programmatic Individual Environmental Report #36 for Lake Pontchartrain and Vicinity - Mitigation. See Appendix K. Bonnet Carre BLH-WET Restoration Project.
[4] This plan was originally developed as part of a Louisiana Coastal Area project called the Amite River Diversion Canal Hydrologic Modification. It entailed cutting gaps in a spoil bank and railroad embankment, dredging conveyance channels and planting vegetation. The project was not recommended in the LCA plan. A portion of the plan is being developed by Livingston Parish under the Coastal Impact Assistance Program. The tree plantings

- **Bonnet Carré Swamp Restoration**[5]
- **Maurepas Crawfish Ponds Swamp Restoration**
- **Lutcher Polder Farmlands Swamp Restoration**

Table K-2 lists the mitigation plan components, the acreage of each component, and the net gain in AAHUs from each component over a 50-year period of analysis.

Table K-2. Mitigation plan components.

Mitigation Project ID*	Proposed Components	Acres	Net Gain AAHUs[6]
BLH1	Bonnet Carré Bottomland Hardwood Restoration	156	99
SWMP1	Swamp Mitigation Bank Credit Purchase	n/a	72
SWMP2	Blind River Swamp Restoration	1,040	339
SWMP3	Bonnet Carré Swamp Restoration	310	121
SWMP4	Maurepas Crawfish Ponds Restoration	1,161	407
SWMP6	Lutcher Polder Farmlands Swamp Restoration	348	151
TOTAL		3,015	1,189

**SWMP5 (Milton Island Swamp Restoration) was removed from the plan, the 131 AAHUs from that site will be accomplished by expanding the acres at SWMP6.*

WVA modeling indicates that the total net gain from the proposed mitigation plan will be 1,189 AAHUs, while the total net loss resulting from all Project habitat impacts is 1,189 AAHUs. This indicates that the mitigation plan would fully compensate for the lost functions/values due to constructing and operating the Project.

4.0 GUIDELINES

GUIDELINES APPLICABLE TO ALL USES

Response: Guidelines 1.1-1.6 and 1.8-1.10 have been read in their entirety and are acknowledged. They have been addressed through the preparation of responses to the guidelines contained within the specific use categories.

Guideline 1.7 It is the policy of the coastal resources program to avoid the following adverse impacts. To this end, all uses and activities shall be planned, sited, designed, constructed, operated and maintained to avoid to the maximum extent practicable significant:

a) reductions in the natural supply of sediment and nutrients to the coastal system by alterations of freshwater flow.

---

feature has been expanded to use as a mitigation project. Depending on the final CIAP project, some additional features may be developed during preconstruction engineering and design for the West Shore mitigation plan.

[5] This plan is as an alternative considered in the Lake Pontchartrain and Vicinity Hurricane and Storm Damage Risk Reduction System, Programmatic Individual Environmental Report for mitigation. The alternative was not recommended but is currently a backup measure to that project. See U.S. Army Corps of Engineers, 2013. Programmatic Individual Environmental Report #36 for Lake Pontchartrain and Vicinity. Appendix L. Bonnet Carré Swamp Restoration: Mitigation for LPV HSDRRS General Swamp Impacts.

[6] Required acre and AAHU amounts are rounded up.

b) adverse economic impacts on the locality of the use and affected governmental bodies.

c) detrimental discharges of inorganic nutrient compounds into coastal waters.

d) alterations in the natural concentration of oxygen in coastal waters.

e) destruction or adverse alterations of streams, wetland, tidal passes, inshore waters and waterbottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features.

f) adverse disruption of existing social patterns.

g) alterations of the natural temperature regime of coastal waters.

h) detrimental changes in existing salinity regimes.

i) detrimental changes in littoral and sediment transport processes.

j) adverse effects of cumulative impacts.

k) detrimental discharges of suspended solids into coastal waters, including turbidity resulting from dredging.

l) reductions or blockage of water flow or natural circulation patterns within or into an estuarine system or a wetland forest.

m) discharges of pathogens or toxic substances into coastal waters.

n) adverse alteration or destruction of archaeological, historical, or other cultural resources.

o) fostering of detrimental secondary impacts in undisturbed or biologically highly productive wetland areas.

p) adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands.

q) adverse alteration or destruction of public parks, shoreline access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern.

r) adverse disruptions of coastal wildlife and fishery migratory patterns.

s) land loss, erosion and subsidence.

t) increases in the potential for flood, hurricane or other storm damage, or increases in the likelihood that damage will occur from such hazards.

u) reductions in the long-term biological productivity of the coastal ecosystem.

Response: This guideline has been read in its entirety. The proposed project would result in unavoidable adverse impacts to wetlands and would slightly alter current freshwater flows. However, various steps were taken to avoid and minimize these adverse impacts. Further, a mitigation plan is developed that would fully offset these unavoidable impacts. Detailed

discussion of these measures can be found in responses to various guidelines throughout this evaluation.

GUIDELINES FOR LEVEES

Guideline 2.1 The leveeing of unmodified or biologically productive wetlands shall be avoided to the maximum extent practicable.
Response: This guideline has been read in its entirety. The proposed hurricane and storm damage risk reduction system avoided to the maximum extent practicable unmodified and biologically productive wetlands through the following steps: 1) Avoiding-- the Project Delivery Team (PDT) avoided potential impacts to wetlands by designing levee alignments and non-structural berm alignments which followed existing pipeline and utility rights of way to avoid segmentation of wetland areas; developed non-structural measures such as storm damage-proofing, structure raising, acquisitions of structures, and relocation of structures. 2) Minimizing: the PDT screened out measures and alignments that could cause potential adverse impacts but had no additional storm damage risk reduction benefits (e.g., alignments along Lakes Pontchartrain and Maurepas). 3) Rectifying: the PDT developed measures for rectifying adverse impacts of restricting tidal exchange (e.g., culverts under the levee which would provide tidal exchange). 4) Reducing: the PDT developed the levee and non-structural systems to simulate the existing hydrologic connectivity. Pumps are included in the system and would only be operated during the approximately 1.7 storm events per year and would be closed for only approximately 8.5 days per year. Consequently, hydrologic connectivity would be generally maintained with the surrounding swamps and Lakes Maurepas and Pontchartrain, except during the closing of the system for storm events. 5) Providing non-structural risk reduction in the St. James Parish area.

- Alternative D has the greatest habitat impacts (approximately 2,080 AAHUs more than Alternative C), highest mitigation costs, the lowest BC ratio, and lowest net benefits.
- Alternatives A and C are comparable in total impacts. Alternative C has fewer direct impacts, while Alternative A has fewer indirect impacts. Alternative A has a total impact of approximately 151 AAHUs less than Alternative C.
- Both Alternative A and C are considered environmentally acceptable alternatives, and provide benefits to the same number of structures.
- Alternative C has the lowest total cost (including mitigation), the highest BC ratio, and highest net benefits.

Although the PDT attempted to avoid and minimize impacts to wetland habitats, the proposed project would result in the direct removal of approximately 1,112 acres of swamp and approximately 124 acres of bottom-land hardwood habitats (BLH). Additionally, the project would enclose an additional 8,432 acres of swamp and 89 acres of BLH. Total direct and indirect impacts that would result from the implementation of the proposed project are expected to be approximately 1,189 average annual habitat units (AAHUs). These unavoidable impacts would be mitigated through the implementation of the attached mitigation plan. Since project impacts were avoided and minimized to the maximum extent practicable, and a mitigation plan is proposed that would compensate for all unavoidable impacts to wetland resources, the proposed plan is consistent with this guideline.

Guideline 2.2 Levees shall be planned and sited to avoid segmentation of wetland areas and systems to the maximum extent practicable.
Response: This guideline has been read in its entirety. The majority of the proposed levee alignment was developed and located parallel and adjacent to existing oil and gas pipeline rights-of-way to minimize segmentation of wetland areas and systems. Existing wetlands in the area are presently segmented and disrupted by the Interstate 10 (constructed in mid 1970s), as

well as numerous oil and gas pipeline corridors and associated access roads; state and local highways (e.g., US 61--Airline Highway, Hwy 641); Reserve Relief Canal and other drainage canals; numerous remnant logging railroad grades, canals and embankments; and undesignated and unimproved gravel and dirt roads and trails throughout the Maurepas swamp. These measures are consistent with this guideline.

Guideline 2.3 Levees constructed for the purpose of developing or otherwise changing the use of a wetland area shall be avoided to the maximum extent practicable.
Response: This guideline has been read in its entirety. The proposed levee system was not designed to enclose and develop existing wetlands. Rather, the proposed plan is to provide risk reduction to hurricane and storm surges. In addition, the structural and non-structural systems are designed to minimize restrictions to tidal exchange through the inclusion of 2 drainage structures, one gated road-crossing, two gated railroad-crossings, and 145 gated-culverts to provide maximum hydrologic exchange that reduces interchange flows by only about 7 percent and, on average, a 10-minute delay in tidal flows. These features allow the includes wetlands to remain in their existing Jursdictional state. These measures are consistent with this guideline.

Guideline 2.4 Hurricane and flood protection levees shall be located at the non-wetland/wetland interface or landward to the maximum extent practicable.
Response: This guideline has been read in its entirety. The structural features were located to minimize to the extent practicable project-induced wetland impacts by locating project features parallel and adjacent to existing oil and gas pipeline rights-of-way to minimize segmentation of wetland areas and systems.

Guideline 2.5 Impoundment levees shall only be constructed in wetland areas as part of approved water or marsh management projects or to prevent release of pollutants.
Response: This guideline has been read in its entirety. The proposed levee system was designed and would be constructed for hurricane and storm damage risk reduction. The purpose of the proposed project is to provide increase storm surge protection for the the communities of Montz, Laplace, Reserve and Garyville. Therefore, the proposed project is consistent with this guideline.

Guideline 2.6 Hurricane or flood protection levee systems shall be designed, built and thereafter operated and maintained utilizing best practical techniques to minimize disruptions of existing hydrologic patterns, and the interchange of water, beneficial nutrients and aquatic organisms between enclosed wetlands and those outside the levee system.
Response: This guideline has been read in its entirety. The proposed hurricane and storm damage risk reduction system was designed and would be constructed and maintained utilizing the best management practices (BMPs) to minimize disruption of existing hydrologic patterns and the interchange of water, beneficial nutrients and aquatic organisms between the enclosed wetlands and those outside the risk reduction system. In addition, the structural and non-structural systems are designed to promote hydraulic exchange with 2 drainage structures, one gated road-crossing, two gated railroad-crossings, and 145 gated-culverts to provide maximum hydrologic exchange that reduces interchange flows by only about 7 percent and, on average, a 10-minute delay in tidal flows. Therefore, the proposed project is consistent with this guideline.

GUIDELINES FOR LINEAR FACILITIES

Guideline 3.1 Linear use alignments shall be planned to avoid adverse impacts on areas of high biological productivity or irreplaceable resource areas.
Response: This guideline has been read in its entirety. The structural and non-structural components of the Proposed Plan (levee,floodwalls, and berms) was planned to avoid, minimize

and reduce potential adverse impacts to significant resources including areas of high biological productivity and irreplaceable resource areas. The structural features of the WSLP were located to minimize to the extent practicable project-induced wetland impacts by locating project features parallel and adjacent to existing oil and gas pipeline rights-of-way (ROWs) to minimize segmentation of wetland areas and systems. Non-structural measures would have little, if any, significant effects on areas of high biological productivity or irreplaceable resource areas. Unavoidable project-related impacts to areas of high biological productivity would be mitigated through the implementation of the attached mitigation plan. Therefore, the proposed project is consistent with this guideline.

Guideline 3.2 Linear facilities involving the use of dredging or filling shall be avoided in wetland and estuarine areas to the maximum extent practicable.
Response: This guideline has been read in its entirety. Approximately 519 acres would be dredged to create two drainage canals, with one canal occurring on either side of the levee. To the maximum extent practicable, the footprint of these drainage canals would be placed within existing pipeline ROWs to minimize impacts to wetland communities. The material from these canals will be use beneficially either in the levee footprint or as part of the Bonnet Carre mitigation site. Unavoidable project-related impacts to wetland areas would be mitigated through the implementation of the attached mitigation plan. Therefore, the proposed project is consistent with this guideline.

Guideline 3.3 Linear facilities involving dredging shall be of the minimum practical size and length.
Response: This guideline has been read in its entirety. A total of 96,481 linear feet would be dredged along both sides of the proposed levee alignment to provide sufficient drainage and to enhance wetland connectivity. The floodside drainage ditch would be approximately 34 feet wide, while the ditch on the protected side of the proposed levee alignment would be approximately 100 feet wide. Numerous culverts and gated crossings would be featured in the proposed alignment to provide maximum hydrologic exchange and reduce delays in tidal flows. The proposed project is consistent with this guideline.

Guideline 3.4 To the maximum extent practicable, pipelines shall be installed through the "push ditch" method and the ditch backfilled.
Response: This guideline has been read in its entirety. Approximately 35 pipeline and utility relocations are expected to occur as a result of the implementation of the proposed plan. To the maximum extent practicable, these relocations would occur within the proposed levee ROW to minimize additional impacts to wetlands and environmentally sensitive areas. This proposed action would not directly include the construction pipelines. These relocations would be covered under either an existing coastal use permit or a modification of this determination depending on if the linear facilities are found to be Federally compensable or not. Therefore, this guideline is not applicable to the project at this time.

Guideline 3.5 Existing corridors, rights-of-way, canals, and streams shall be utilized to the maximum extent practicable for linear facilities.
Response: This guideline has been read in its entirety. The structural component (levee and floodwalls) of the proposed plan is located adjacent and parallel to existing oil and gas pipeline corridors to avoid multiple crossings and to avoid the potential risks associated with and disruption of services provided by these pipelines if these pipelines where relocated. The proposed non-structural berms would be located along property boundaries and would avoid environmentally sensitive areas to the maximum extent practicable. Therefore, the proposed plan is consistent with this guideline.

Guideline 3.6 Linear facilities and alignments shall be, to the maximum extent practicable, designed and constructed to permit multiple uses consistent with the nature of the facility.
Response: This guideline has been read in its entirety. Federal participation and separable recreation measures is not permitted by current budget policies for hurricane and storm damage reduction projects (source: ER 1105-2-100, Appendix E page 143). Therefore, this guideline does not pertain to the proposed plan.

Guideline 3.7 Linear facilities involving dredging shall not traverse or adversely affect any barrier island.
Response: This guideline has been read in its entirety. This guideline does not pertain to the proposed plan.

Guideline 3.8 Linear facilities involving dredging shall not traverse beaches, tidal passes, protective reefs or other natural gulf shoreline unless no other alternative exists. If a beach, tidal pass, reef or other natural gulf shoreline must be traversed for a non-navigation canal, they shall be restored at least to their natural condition immediately upon completion of construction. Tidal passes shall not be permanently widened or deepened except when necessary to conduct the use. The best available restoration techniques which improve the traversed area's ability to serve as a shoreline shall be used
Response: This guideline has been read in its entirety. This guideline does not pertain to the proposed plan.

Guideline 3.9 Linear facilities shall be planned, designed, located and built using the best practical techniques to minimize disruption of natural hydrologic and sediment transport patterns, sheet flow, and water quality, and to minimize adverse impacts on wetlands.
Response: This guideline has been read in its entirety. To the maximum extent practicable, the proposed hurricane and storm damage risk reduction system was designed and would be constructed and maintained utilizing the best management practices (BMPs) to minimize disruption of existing hydrologic patterns and the interchange of water, beneficial nutrients and aquatic organisms between the enclosed wetlands and those outside the risk reduction system. In addition, the structural system is designed to reduce restrictions of tidal exchange through the inclusion of 2 drainage structures, one gated road-crossing, two gated railroad-crossings, and 145 gated-culverts to provide maximum hydrologic exchange that reduces interchange flows by only about 7 percent and, on average, a 10-minute delay in tidal flows. Should the trend of increased precipitation and climate change continue, there could be continued increases in runoff associated with increased rainfall events which may affect the total volume of freshwater in the area as well as storm damage peak events. Non-structural measures would have little, if any, significant effects on hydrologic patterns, or the interchange of water, nutrients, or aquatic organisms. Therefore, the proposed plan is consistent with this guideline.

Guideline 3.10 Linear facilities shall be planned, designed, and built using the best practical techniques to prevent bank slumping and erosion, saltwater intrusion, and to minimize the potential for inland movement of storm-generated surges. Consideration shall be given to the use of locks in navigation canals and channels which connect more saline areas with fresher areas.
Response: This guideline has been read in its entirety. To the maximum extent practicable, the proposed hurricane and storm damage risk reduction system and the non-structural project features would be designed, constructed, and maintained utilizing the best management practices (BMPs) to minimize disruption of existing hydrologic patterns and the interchange of water, beneficial nutrients and aquatic organisms between the enclosed wetlands and those outside the risk reduction system. Therefore, the proposed project is consistent with this guideline.

Guideline 3.11 All non-navigation canals, channels and ditches which connect more saline areas with fresher areas shall be plugged at all waterway crossings and at intervals between crossings in order to compartmentalize them. The plugs shall be properly maintained.
Response: This guideline has been read in its entirety. The proposed plan would not increase tidal exchange or promote the exchange of more saline waters with fresh waters. In fact, the system is designed to minimize impacts to the hydraulic connectivity within the project area through the incorporation of 2 drainage structures, one gated road-crossing, two gated railroad-crossings, and 145 gated-culverts to provide maximum hydrologic exchange that reduces interchange flows by only about 7 percent and, on average, a 10-minute delay in tidal flows. These exchanges are currently occurring, and these project features are only designed to reduce changes to the existing hydrologic patterns in the project area. Therefore, the proposed plan is consistent with this guideline.

Guideline 3.12 The multiple use of existing canals, directional drilling and other practical techniques shall be utilized to the maximum extent practicable to minimize the number and size of access canals, to minimize changes of natural systems and to minimize adverse impacts on natural areas and wildlife and fisheries habitat.
Response: This guideline has been read in its entirety. All existing drainage culverts under I-10 would be connected to adjacent drainage culverts within the levee thereby minimizing changes to the existing hydrology of the system and providing hydrologic connectivity between the enclosed and outside areas. Therefore, the proposed project is consistent with this guideline.

Guideline 3.13 All pipelines shall be constructed in accordance with parts 191, 192, and 195 of Title 49 of the Code of Federal Regulations, as amended, and in conformance with the Commissioner of Conservation's Pipeline Safety Rules and Regulations and those safety requirements established by La. R. S. 45:408, whichever would require higher standards.
Response: This guideline has been read in its entirety. Approximately 35 pipeline and utility relocations are expected to occur as a result of the implementation of the proposed plan. To the maximum extent practicable, these relocations would occur within the proposed levee ROW to minimize additional impacts to wetlands and environmentally sensitive areas. This proposed action would not directly include the construction pipelines. These relocations would be covered under either an existing coastal use permit or a modification of this determination depending on if the linear facilities are found to be Federally compensable or not. Therefore, this guideline is not applicable to the project at this time.

Guideline 3.14 Areas dredged for linear facilities shall be backfilled or otherwise restored to the pre-existing conditions upon cessation of use for navigation purposes to the maximum extent practicable.
Response: This guideline has been read in its entirety. Approximately 3,363,000 cy of material would be dredged during the construction of the proposed pump station canals and drainage ditches that would parallel the levee alignment. It is estimated that approximately 1,678,000 cy of this material would be suitable for levee construction. However, approximately 1,685,000 cy of this material would not be suitable for levee construction and would be used beneficially through the mitigation plan. These dredged canals and ditches are permanent features of the proposed WSLP plan, and would not be backfilled. The proposed project is consistent with this guideline to the maximum extent practicable.

Guideline 3.15 The best practical techniques for site restoration and re-vegetation shall be utilized for all linear facilities.
Response: This guideline has been read in its entirety. Proposed levee features, pump stations, gated structures, ditches, and canals would be maintained in accordance with a published Operations and Maintenance (O&M) Plan for the WSLP Project. Regular

maintenance of these project features would prohibit site restoration and re-vegetation after project construction. However, unavoidable project-related impacts to areas of high biological productivity would be mitigated through the implementation of the attached mitigation plan. Therefore, the proposed project is consistent with this guideline to the maximum extent practicable

Guideline 3.16 Confined and dead end canals shall be avoided to the maximum extent practicable. Approved canals must be designed and constructed using the best practical techniques to avoid water stagnation and eutrophication.
Response: This guideline has been read in its entirety. No confined or dead end canals are proposed in the WSLP plan. In fact, the system is designed to maintain existing hydraulic connectivity within the project area through the incorporation of 2 drainage structures, one gated road-crossing, two gated railroad-crossings, and 145 gated-culverts to provide maximum hydrologic exchange that reduces interchange flows by only about 7 percent and, on average, a 10-minute delay in tidal flows. These exchanges are currently occurring, and these project features are only designed to reduce changes to the existing hydrologic patterns in the project area. Therefore, this project, as proposed, is consistent with this guideline.

GUIDELINES FOR DREDGED MATERIAL DEPOSITION

Guideline 4.1 Spoil shall be deposited utilizing the best practical techniques to avoid disruption of water movement, flow, circulation and quality.
Response: This guideline has been read in its entirety. Approximately 3,363,000 cy of material would be dredged during the construction of the proposed pump station canals and drainage ditches that would parallel the levee alignment. It is estimated that approximately 1,678,000 cy of this material would be suitable for levee construction and would likely be used as embankment material. However, approximately 1,685,000 cy of this material would not be suitable for levee construction and would either be used beneficially through the mitigation plan. Therefore, the proposed project is consistent with this guideline.

Guideline 4.2 Spoil shall be used beneficially to the maximum extent practicable to improve productivity or create new habitat, reduce or compensate for environmental damage done by dredging activities, or prevent environmental damage. Otherwise, existing spoil disposal areas or upland disposal shall be utilized to the maximum extent practicable rather than creating new disposal areas.
Response: This guideline has been read in its entirety. See response 4.1 regarding potential beneficial use of dredged material.

Guideline 4.3 Spoil shall not be disposed of in a manner which could result in the impounding or draining of wetlands or the creation of development sites unless the spoil deposition is part of an approved levee or land surface alteration project.
Response: This guideline has been read in its entirety. Approximately 3,363,000 cy of material would be dredged during the construction of the proposed pump station canals and drainage ditches that would parallel the levee alignment. It is estimated that approximately 1,678,000 cy of this material would be suitable for levee construction and would likely be used as embankment material. However, approximately 1,685,000 cy of this material would not be suitable for levee construction and would be place in a way as not to impound or drain wetlands. Therefore, the proposed project is consistent with this guideline.

Guideline 4.4 Spoil shall not be disposed of on marsh, known oyster or clam reef s or in areas of submersed vegetation to the maximum extent practicable.

Response: This guideline has been read in its entirety. Approximately 3,363,000 cy of material would be dredged during the construction of the proposed pump station canals and drainage ditches that would parallel the levee alignment. It is estimated that approximately 1,678,000 cy of this material would be suitable for levee construction and would likely be used as embankment material. However, approximately 1,685,000 cy of this material would not be suitable for levee construction and would not, to the maximum extent practicable, be disposed of on marsh, known oyster or clam reefs or in areas of submersed vegetation. Therefore, the proposed project is consistent with this guideline.

Guideline 4.5 Spoil shall not be disposed of in such a manner as to create a hindrance to navigation or fishing, or hinder timber growth.
Response: This guideline has been read in its entirety. Spoil would not be disposed of in such a manner as to create a hindrance to navigation or fishing, or hinder timber growth. Therefore, the proposed project is consistent with this guideline

Guideline 4.6 Spoil disposal areas shall be designed and constructed and maintained using the best practical techniques to retain the spoil at the site, reduce turbidity, and reduce shoreline erosion when appropriate.
Response: This guideline has been read in its entirety. See Response 4.1. Spoil disposal areas would be designed and constructed and maintained using the best practical techniques to retain the spoil at the site, reduce turbidity, and reduce shoreline erosion when appropriate. Therefore, the proposed project is consistent with this guideline

Guideline 4.7 The alienation of state-owned property shall not result from spoil deposition activities without the consent of the Department of Natural Resources.
Response: This guideline has been read in its entirety. Concur.

GUIDELINES FOR SHORELINE MODIFICATION

Response: These guidelines have been read in their entirety. These guidelines do not pertain to the proposed plan.

GUIDELINES FOR SURFACE ALTERATIONS

Guideline 6.1 Industrial, commercial, urban, residential, and recreational uses are necessary to provide adequate economic growth and development. To this end, such uses would be encouraged in those areas of the coastal zone that are suitable for development. Those uses shall be consistent with the other guidelines and shall, to the maximum extent practicable, take place only:

a) on lands five feet or more above sea level or within fast lands; or

b) on lands which have foundation conditions sufficiently stable to support the use, and where flood and storm hazards are minimal or where protection from these hazards can be reasonably well achieved, and where the public safety would not be unreasonably endangered; and

1) the land is already in high intensity of development use, or

2) there is adequate supporting infrastructure, or

3) the vicinity has a tradition of use for similar habitation or development

Response: This guideline has been read in its entirety. The proposed project is not meant to induce further development within the project area. Instead, it is meant as a means to protect existing structures and infrastructure during storm surges. In fact, the structural portion of the proposed WSLP system is designed to maintain current hydraulic connectivity " with 2 drainage structures, one gated road-crossing, two gated railroad-crossings, and 145 gated-culverts to provide maximum hydrologic exchange that reduces interchange flows by only about 7 percent and, on average, a 10-minute delay in tidal flows. These exchanges are currently occurring, and these project features are designed to reduce changes to the existing hydrologic patterns in the project area. The nonstructural component of the WSLP project includes berms that would restrict tidal flow, however, the areas protected by these berms are already developed and they would not likely induced further development. Therefore, the proposed project is consistent with this guideline.

Guideline 6.2 Public and private works projects such as levees, drainage improvements, roads, airports, ports, and public utilities are necessary to protect and support needed development and shall be encouraged. Such projects shall, to the maximum extent practicable, take place only when:

a) they protect or serve those areas suitable for development pursuant to Guideline 6.1; and

b) they are consistent with the other guidelines; and

c) they are consistent with all relevant adopted state, local and regional plans.

Response: This guideline has been read in its entirety. The WSLP, as proposed, is consistent with this guidline.

Guideline 6.3 BLANK (Deleted)

Guideline 6.4 To the maximum extent practicable wetland areas shall not be drained -or filled. Any approved drain or fill project shall be designed and constructed using best practical techniques to minimize present and future property damage and adverse environmental impacts.

Response: This guideline has been read in its entirety. The structural component of the Proposed Plan (levee and floodwalls) was planned to avoid, minimize and reduce potential adverse impacts to significant resources including areas of high biological productivity and irreplaceable resource areas. The structural features of the WSLP were located to minimize to the extent practicable project-induced wetland impacts by locating project features parallel and adjacent to existing oil and gas pipeline rights-of-way (ROWs) to minimize segmentation of wetland areas and systems. Non-structural measures would have little, if any, significant effects on areas of high biological productivity or irreplaceable resource areas. BMPs would be implemented during the construction of structural and non-structural features of the project. Unavoidable project-related impacts to wetland areas would be mitigated through the implementation of the attached mitigation plan. Therefore, the proposed project is consistent with this guideline.

Guideline 6.5 Coastal water dependent uses shall be given special consideration in permitting because of their reduced choice of alternatives.

Response: This guideline has been read in its entirety. This guideline is not applicable to the proposed project.

Guideline 6.6 Areas modified by surface alteration activities shall, to the maximum extent practicable, be re-vegetated, refilled, cleaned and restored to their predevelopment condition upon termination of the use
Response: This guideline has been read in its entirety. Proposed levee features, pump stations, gated structures, ditches, and canals would be maintained in accordance with a published Operations and Maintenance (O&M) Plan for the WSLP Project. Regular maintenance of these project features would prohibit site restoration and re-vegetation after project construction. However, unavoidable project-related that would permanently alter surface areas would be mitigated through the implementation of the attached mitigation plan. The proposed project, to the maximum extent practicable, would be consistent with this guideline.

Guideline 6.7 Site clearing shall to the maximum extent practicable be limited to those areas immediately required for physical development.
Response: This guideline has been read in its entirety. The structural and non-structural components of the Proposed Plan (levee and floodwalls) were planned to avoid, minimize and reduce potential adverse impacts to significant resources including areas of high biological productivity and irreplaceable resource areas. The structural features of the WSLP were located to minimize to the extent practicable project-induced wetland impacts by locating project features parallel and adjacent to existing oil and gas pipeline rights-of-way (ROWs) to minimize segmentation of wetland areas and systems. Non-structural measures would have little, if any, significant effect on areas of high biological productivity or irreplaceable resource areas. Clearing would be limited to only that which would be required for project construction and O&M responsibilities. Unavoidable project-related impacts would be mitigated through the implementation of the attached mitigation plan. The proposed project, to the maximum extent practicable, would be consistent with this guideline.

Guideline 6.8 Surface alterations shall, to the maximum extent practicable, be located away from critical wildlife areas and vegetation areas. Alterations in wildlife preserves and management areas shall be conducted in strict accord with the requirements of the wildlife management body.
Response: This guideline has been read in its entirety. It is anticipated that there will be approximately 373 acres of swamp impacted on Maurepas Wildlife Management area by the proposed plan, however through the implementation of the mitigation plan, which includes habitat restoration and purchase of mitigation credits, these impacts will be offset. The structural features of the WSLP were located to minimize to the extent practicable project-induced wetland impacts by locating project features parallel and adjacent to existing oil and gas pipeline rights-of-way (ROWs) to minimize segmentation of wetland areas and systems. Non-structural measures would have little, if any, significant effect on areas of high biological productivity or irreplaceable resource areas. Unavoidable project-related impacts to areas of high biological productivity would be mitigated through the implementation of the attached mitigation plan. Therefore, the proposed project is consistent with this guideline.

Guidelines 6.9 - 6.12
Response: These guidelines have been read in their entirety. These guidelines do not pertain to the WSLP project, as proposed..

Guideline 6.13 Surface alteration sites and facilities shall be designed, constructed, and operated using the best practical techniques to prevent the release of pollutants or toxic substances into the environment and minimize other adverse impacts.
Response: This guideline has been read in its entirety. BMPs would be utilized during all construction and O&M activities associated with the WSLP project to minimize the impacts of these actions to adjacent areas. Therefore the proposed plan is consistent with this guideline.

Guideline 6.14 *To the maximum extent practicable only material that is free of contaminants and compatible with the environmental setting shall be used as fill.*
Response: This guideline has been read in its entirety. Only material that is free of contaminants and is compatible with the environmental setting would be used as fill for the proposed WSLP project. Therefore the proposed plan is consistent with this guideline.

GUIDELINES FOR HYDROLOGIC AND SEDIMENT TRANSPORT MODIFICATIONS

Response: Guidelines 7.1 – 7.4 and 7.7 – 7.9 have been read in their entirety. The proposed plan would not involve hydrologic or sediment transport modifications and, therefore, these guidelines are not applicable.

Guideline 7.5 *Water or marsh management plans shall result in an overall benefit to the productivity of the area.*
Response: This guideline has been read in its entirety. Project features including 2 drainage structures, one gated road-crossing, two gated railroad-crossings, and 145 gated-culverts have been designed to provide maximum hydrologic exchange upon project completion. Inclusion of these features would allow normal tidal exchanges while protecting the project area from storm surges. Therefore, it is anticipated that the water management plan is consistent with this guideline.

Guideline 7.6 *Water control structures shall be assessed separately based on their individual merits and impacts and in relation to their overall water or marsh management plan of which they are a part.*
Response: This guideline has been read in its entirety. Project features including 2 drainage structures, one gated road-crossing, two gated railroad-crossings, and 145 gated-culverts have been designed to provide maximum hydrologic exchange upon project completion. Inclusion of these features would allow normal tidal exchanges while protecting the project area from storm surges. Therefore, it is anticipated that the water management plan is consistent with this guideline.

GUIDELINES FOR DISPOSAL OF WASTES

Response: These guidelines have been read in their entirety. The proposed plan would not involve the disposal of wastes and, therefore, these guidelines are not applicable.

GUIDELINES FOR USES THAT RESULT IN THE ALTERATION OF WATERS DRAINING INTO COASTAL WATERS

Guideline 9.1 *Upland and upstream water management programs which affect coastal waters and wetlands shall be designed and constructed to preserve or enhance existing water quality, volume, and rate of flow to the maximum extent practicable.*
Response: This guideline has been read in its entirety. The WSLP, as proposed, would not include upland or upstream water management programs.

Guideline 9.2 *Runoff from developed areas shall to the maximum extent practicable be managed to simulate natural water patterns, quantity, quality and rate of flow.*

Response: This guideline has been read in its entirety. The structural and non-structural portions of the proposed WSLP system are designed to maintain tidal exchange through the incorporation of 2 drainage structures, one gated road-crossing, two gated railroad-crossings, and 145 gated-culverts to provide maximum hydrologic exchange that reduces interchange flows by only about 7 percent and, on average, a 10-minute delay in tidal flows. These exchanges are currently occurring, and these project features are designed to reduce changes to the existing hydrologic patterns in the project area. Therefore, the proposed project is consistent with this guideline to the maximum extent practicable.

Guideline 9.3 *Runoff and erosion from agricultural lands shall be minimized through the best practical techniques.*
Response: This guideline has been read in its entirety. The proposed plan would not involve alteration or management of agricultural lands and, therefore, this guideline is not applicable.

GUIDELINES FOR OIL, GAS, AND OTHER MINERAL ACTIVITIES

Response: These guidelines have been read in their entirety. The proposed plan would not involve oil, gas, and other mineral activities and, therefore, these guidelines are not applicable.

OTHER STATE POLICIES INCORPORATED INTO THE PROGRAM

Section 213.8A of Act 361 directs the Secretary of DOTD, in developing the LCRP, to include all applicable legal and management provisions that affect the coastal zone or are necessary to achieve the purposes of Act 361 or to implement the guidelines effectively. It states:

The Secretary shall develop the overall state coastal management program consisting of all applicable constitutional provisions, laws and regulations of this state which affect the coastal zone in accordance with the provisions of this Part and shall include within the program such other applicable constitutional or statutory provisions, or other regulatory or management programs or activities as may be necessary to achieve the purposes of this Part or necessary to implement the guidelines hereinafter set forth.

The constitutional provisions and other statutory provisions, regulations, and management and regulatory programs incorporated into the LCRP are identified and described in Appendix 1. A description of how these other authorities are integrated into the LCRP and coordinated during program implementation is presented in Chapter IV. Since all of these policies are incorporated into the LCRP, federal agencies must ensure that their proposed actions are consistent with these policies as well as the coastal use guidelines. (CZMA, Section 307)

CONSISTENCY DETERMINATION

The proposed plan would provide, consistent with Congressional authorizations, hurricane and storm damage risk reduction for St. Charles, St. John the Baptist and St. James Parishes that would be economically and environmentally justified. The proposed plan is consistent with the guidelines for all users, levees, linear facilities, dredged material deposition, surface alterations, and hydrologic and sediment transport, and alteration of waters draining into coastal waters. Based on this evaluation and the findings of the Final Environmental Impact Statement (EIS #0901), the U. S. Army Corps of Engineers, New Orleans District, has determined that the

proposed is consistent, to the maximum extent practicable, with the State of Louisiana's Coastal Resources Program.

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex C

Louisiana State Department of Wildlife and Fisheries Mitigation Letter

BOBBY JINDAL
GOVERNOR

State of Louisiana

ROBERT J. BARHAM
SECRETARY

DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF WILDLIFE

JIMMY L. ANTHONY
ASSISTANT SECRETARY

October 24, 2012

Colonel Edward R. Fleming
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

RE: *West Shore Lake Pontchartrain Hurricane Levee Project*

Dear Colonel Fleming:

The professional staff of the Louisiana Department of Wildlife and Fisheries (LDWF) has reviewed limited information concerning the West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study in Ascension, St. Charles, St. James, and St. John the Baptist Parishes, Louisiana. The information included three preliminary levee alignments which would provide Federal hurricane protection to the western shore of Lake Pontchartrain. Based upon our review of the limited information, LDWF provides the following comments and questions. We recommend that each comment and question be thoroughly considered and satisfactorily addressed by the U.S. Army Corps of Engineers (USACE).

Natural and Scenic River

The Blind River, which is a Louisiana designated Natural and Scenic River, is located within Alignment D of the proposed project. The purpose of the Natural and Scenic Rivers Act is to preserve, protect, develop, reclaim, and enhance the wilderness qualities, scenic beauties, and ecological regime of certain free-flowing streams. A Scenic Rivers Permit will be required for Alignment D if LDWF determines that the levee has the potential to directly and significantly degrade the ecological integrity of the river. Please contact Mr. Keith Cascio at 318-343-4045 or kcascio@wlf.la.gov concerning this Natural and Scenic River.

Wildlife Management Area

Our database indicates that all levee Alignments (i.e., A, C and D) occur within the boundaries of Maurepas Swamp Wildlife Management Area (WMA). However, Alignment D will impact the WMA more significantly than the other alignments. No activities shall occur within any WMA/refuge without first obtaining proper authorization from LDWF. Please contact Mr. Mike Windham at 504-284-5268 or cwindham@wlf.la.gov for more information about appropriate WMA authorizations.

Endangered Species

Manatees (*Trichechus manatus*) are known to occur in the surrounding water bodies of Alignment D. Manatees are large mammals inhabiting both fresh and salt water. Although most manatees are year round residents of Florida or Central America, they have been known to migrate to areas along the

Atlantic and Gulf Coast during the summer months. Manatees are an endangered species protected under the Endangered Species Act of 1973 and the Federal Marine Mammal Protection Act of 1972. In Louisiana, taking or harassment of the manatee is a violation of state and federal laws. Critical habitat for manatees includes marine submergent vascular vegetation (sea-grass beds). Areas with sea-grass beds should be avoided during project activities if possible. Please contact Mr. Beau Gregory at 337-491-2575 or bgregory@wlf.la.gov for more information about manatees.

Bird Nesting Colonies

Our Natural Heritage Program database indicates the presence of bird nesting colonies within one mile of the western end of Alignment D. Please be aware that entry into or disturbance of active breeding colonies is prohibited by LDWF. To minimize disturbance to colonial nesting birds, LDWF prohibits work within a certain radius of an active nesting colony. The following restrictions on activity should be observed:

- For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, roseate spoonbills, anhingas, and/or cormorants), all project activity occurring within 300 meters of an active nesting colony should be restricted to the non-nesting period (i.e., September 1 through February 15).
- For colonies containing nesting gulls, terns, and/or black skimmers, all project activity occurring within 400 meters (700 meters for brown pelicans) of an active nesting colony should be restricted to the non-nesting period (i.e., September 16 through April 1).

Please contact Ms. Carolyn Michon at 225-765-2357 or cmichon@wlf.la.gov for more information on bird nesting colonies.

Compensatory Mitigation

This levee project may result in the loss of significant habitat that provides ecological services such as resource production, water quality improvement, flood peak reduction and hurricane abatement. The loss of these ecological services must be compensated with mitigation. Therefore, if the proposed activity is approved by the regulatory agencies, the applicant shall develop a mitigation plan designed to off-set all impacts to wetland functions and fish and wildlife resources. A mitigation plan should be approved by the resource and regulatory agencies and be implemented concurrently with levee construction. Furthermore, the mitigation shall be located within the same hydrologic basin as the impacts.

Planning Considerations

LDWF believes that alternative borrow sites should be considered, including but not limited to, hauled in material to avoid further impacts. Hauled in material shall be free of contaminates. Borrow sites from within the project area would impact a larger footprint of wildlife and fisheries habitat.

The proposed levee alignments, in particular Alignment D, could potentially restrict recreational opportunities, boating access and other fishing vessels.

Summary and Conclusions

LDWF understands the need to protect these communities; nevertheless, we believe a proper plan would ensure that impacts are minimized and all necessary mitigation is carried out. LDWF believes Alignment A will result in the least amount of impact to valuable forested wetland habitat. Understandably, Alignment C might be more feasible from an engineering standpoint. Alignment D will likely result in the most impacts to fish and wildlife resources, including Maurepas Swamp WMA and Blind River.

Proposed Alignments C and D will impound wetlands thereby reducing exchange of nutrients which most estuarine species are dependent upon. LDWF believes that precautions should be taken to allow for

adequate aquatic species migration. Should Alignments C or D be chosen, adequately sized water control structures must be placed within the levee to allow for ingress and egress of estuarine species, proper drainage, tidal exchange, and the natural release of fresh water (sheet flow) into the coastal system. Water control structures, including but not limited to, culverts should be scaled as large as possible, located frequently, and should be placed in a way that mimics natural bottom contours.

LDWF is further concerned with indirect impacts which may result from the proposed activity. Specifically, by affording flood protection to an area comprised of wetlands, the project may promote future development in wetland areas. Additionally, the levee alignment may alter natural periods of inundation or soil saturation in the impounded wetlands and could prove detrimental to their function and longevity. Alignments C and D could likely reduce the natural storage capacity the wetlands provide, thereby, increasing the risk of induced flooding in other areas.

The Louisiana Department of Wildlife and Fisheries submits these recommendations to the U.S. Army Corps of Engineers in accordance with provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.). Please do not hesitate to contact Mr. Kyle Balkum at 225-765-2819 should you need further assistance.

Sincerely,

Jimmy L. Anthony
Assistant Secretary

c: LDNR, Office of Coastal Management
EPA, Marine & Wetlands Section
National Marine Fisheries Service
USFWS, Ecological Services
Keith Cascio, LDWF
Beau Gregory, LDWF
Barry Hebert, LDWF
Carolyn Michon, LDWF
Mike Windham, LDWF
Christian Winslow, LDWF

-----Original Message-----
From: Balkum, Kyle [mailto:kbalkum@wlf.la.gov]
Sent: Thursday, May 23, 2013 3:29 PM
To: Klein, William P Jr MVN
Cc: Winslow, Christian J.; Cascio, Keith; Hebert, Barry; Ribbeck, Kenny; Breaux, Catherine M MVN; 'Catherine_Breaux@fws.gov'; 'Lisa Abernathy'; 'Ettinger.John@epamail.epa.gov'; Richardson, Jerica M MVN; Varisco, Jeffrey J MVN; Myers, Randy; Tuma, Tommy; Mooney, Brad
Subject: LDWF Scoping Comments (Part 2) - West Shore Lake Pontchartrain

Bill,

In addition to our previously submitted scoping comments, LDWF is providing the West Shore-LP PDT with proposed mitigation measures that we believe can best offset impacts associate with levee construction. You will receive the following two documents today:

1. pdf-document that briefly describes the nine conceptual mitigation measures proposed by LDWF, and
2. jpg-map that illustrates the nine mitigation measures (to follow in a subsequent e-mail).

We hope that this draft mitigation plan is included in the Draft TSP.

We look forward to working with you to further develop these proposed mitigation measures in order to ensure that project impacts are adequately and appropriately mitigated for.

Thanks,
Kyle

Kyle F. Balkum
Biologist Program Manager, Habitat Section -
Louisiana Department of Wildlife and Fisheries
2000 Quail Dr., Baton Rouge, LA 70808
225-765-2819 / kbalkum@wlf.la.gov

DRAFT Maurepas Swamp WMA Mitigation Proposals

Prepared by the Louisiana Department of Wildlife and Fisheries (LDWF)

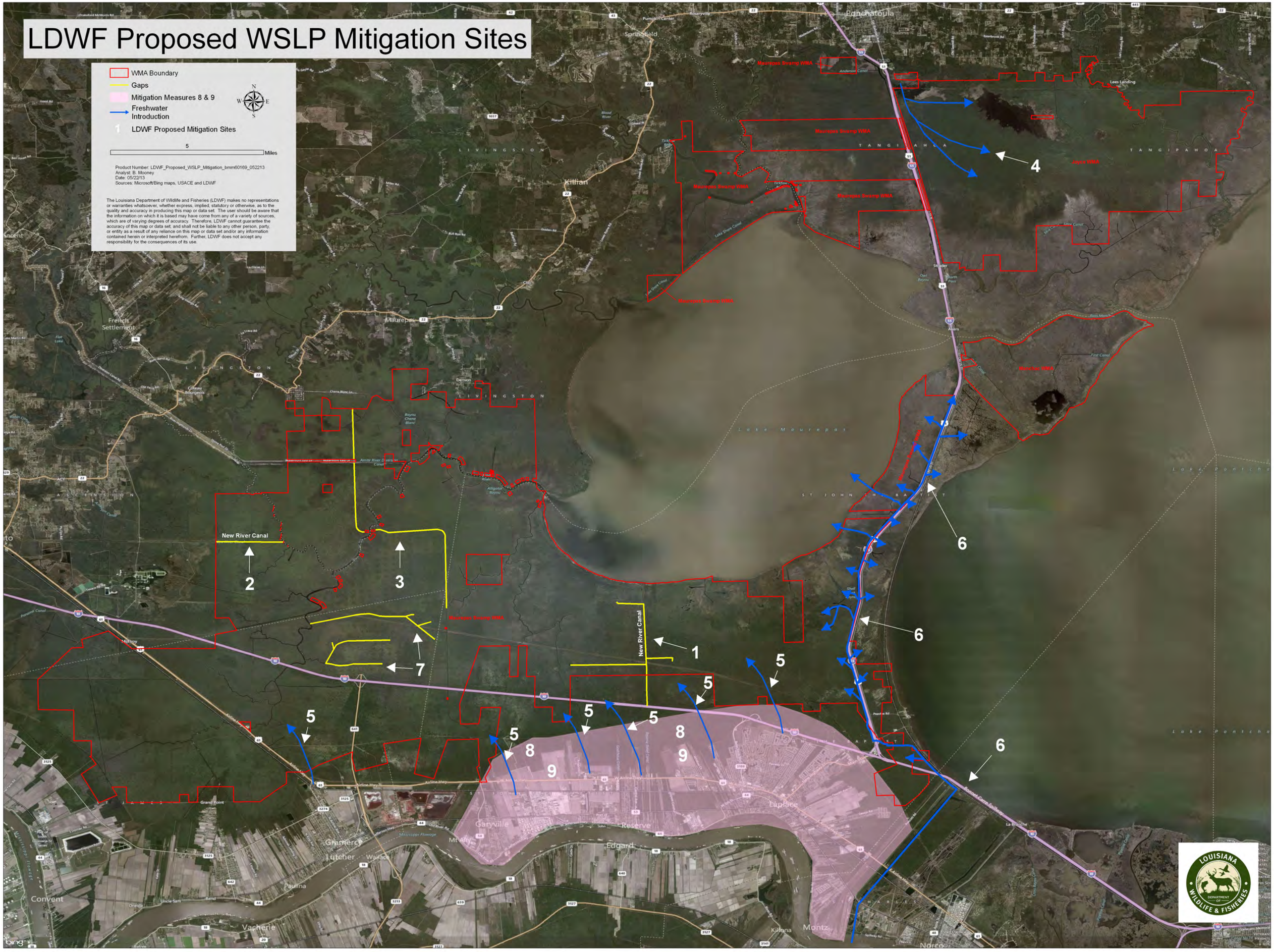
Presented to the West Shore-Lake Pontchartrain Project Delivery Team (PDT)

May 23, 2013

The elimination of nutrient and freshwater inputs threatens the sustainability of the Maurepas Swamp. The most effective strategy to restore health and productivity of the swamp is construction of Mississippi River reintroductions into Maurepas Swamp. However, additional measures such as eliminating barriers to surface flow patterns are also needed, not only to compliment the planned river reintroductions, but also to improve current hydrologic conditions. Therefore, the mitigation measures identified below by LDWF primarily aim to enhance or improve surface hydrology until such time that river reintroductions are constructed. The mitigation measures are still conceptual and will require further planning and engineering. LDWF also prioritized each measure (i.e., High, Medium or Low) to inform the PDT on which measures are believed to be most beneficial.

1. Gap spoil banks along Reserve Relief Canal (**High priority**).
2. Gap spoil banks along New River Canal (**High priority**).
3. Gap/degrade railroad bed which traverses the swamp beginning from Hope Canal and proceeding north and west to the northern property boundary (crossing Blind River and Amite River Diversion Canal (**High priority**).
4. Improve through flow of Hammond wastewater into existing Joyce WMA outfall area (**High priority**).
5. Make efficient use of stormwater and wastewater produced by communities south of I-10 (e.g., Laplace, Ascension Parish) by distributing this water into the Maurepas Swamp (**High priority**).
6. Diversion of freshwater from Bonnet Carre Spillway guide levee to the swamps and marshes to the northwest (**Medium priority**).
7. Gap any spoil banks north of I-10 in the area of Tennessee Williams (**Medium priority**).
8. Preserve existing wetlands by acquiring land in fee title that is enclosed within the levee (**Low priority**).
9. Restrict development in wetlands enclosed within the levee (**Low priority**).

The number of the proposed mitigation measure corresponds with the number on the accompanying map.


LDWF Proposed WSLP Mitigation Sites
WMA Boundary
Gaps
Mitigation Measures 8 & 9
Freshwater Introduction
LDWF Proposed Mitigation Sites
5
Miles
Product Number: LDWF_Proposed_WSLP_Mitigation_bmm60169_052213
Analyst: B. Mooney
Date: 05/22/13
Sources: Microsoft/Bing maps, USACE and LDWF
The Louisiana Department of Wildlife and Fisheries (LDWF) makes no representations or warranties whatsoever, whether express, implied, statutory or otherwise, as to the quality and accuracy in producing this map or data set. The user should be aware that the information on which it is based may have come from any of a variety of sources, which are of varying degrees of accuracy. Therefore, LDWF cannot guarantee the accuracy of this map or data set, and shall not be liable to any other person, party, or entity as a result of any reliance on this map or data set and/or any information contained herein or interpreted herefrom. Further, LDWF does not accept any responsibility for the consequences of its use.
Ponchatoula
Springfield
Killian
Maurepas
French Settlement
Lake Maurepas
New River Canal
Garyville
Reserve
Edgard
Laplace
Gramercy
Lutcher
Paulina
Convent
Vacherie
Montz
Norco
1
2
3
4
5
6
7
8
9
LOUISIANA WILDLIFE & FISHERIES

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex D

National Marine Fisheries Service Scoping / Planning Aid Letter

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

January 29, 2009 F/SER46/RH:jk
225/389-0508

Ms. Elizabeth Wiggins, Chief
Environmental Compliance and Analysis Branch
New Orleans District
Department of the Army, Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Ms. Wiggins:

NOAA's National Marine Fisheries Service (NMFS) has received the public notice dated December 17, 2008, announcing a scoping meeting and the intention of the New Orleans District (NOD) to prepare an Environmental Impact Statement (EIS) for the **West Shore-Lake Pontchartrain, Louisiana; Hurricane and Storm Damage Risk Reduction Feasibility Study**. The purpose of the study is to assess the feasibility and impacts of providing hurricane and storm surge damage risk reduction measures to a study area bounded by the Bonnet Carre Spillway to the east, the Mississippi River to the south, Lakes Pontchartrain and Maurepas to the north, and the St. James Parish/Ascension Parish line to the west. According to the public notice, previous studies have identified four preliminary levee alignments. The draft EIS will consider those alignments and other reasonable alternatives to provide hurricane and storm risk reduction to the project area.

Aquatic and tidally influenced wetland habitats in portions of the study area are designated as essential fish habitat (EFH) for economically important fishery species managed by the Gulf of Mexico Fishery Management Council (GMFMC), including white shrimp and red drum. Primary categories of EFH in the study area include estuarine emergent wetlands, submerged aquatic vegetation, mud substrates, and estuarine water column. Detailed information on federally-managed fisheries and their EFH is provided in the 2005 generic amendment of the Fishery Management Plans for the Gulf of Mexico prepared by the GMFMC. The generic amendment was prepared as required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act, P.L. 104-297).

In addition to being designated as EFH for white shrimp and red drum, water bodies and wetlands in the study area provide nursery and foraging habitats supportive of a variety of economically important marine fishery species, such as striped mullet, Atlantic croaker, gulf menhaden, and blue crab. Some of these species also serve as prey for other fish species managed under the Magnuson-Stevens Act by the GMFMC (e.g., mackerels, snappers, and groupers) and highly migratory species managed by NMFS (e.g., billfishes and sharks).

NMFS recommends the EIS include separate sections titled "Essential Fish Habitat" and "Marine Fishery Resources" that identify the EFH and fisheries resources of the study area. The EIS should describe the potential direct and indirect impacts on fishery resources and each category of EFH used by federally managed fishery species and their life stages. A discussion should be included on direct adverse impacts that may result from placement of fill in wetlands to construct levee sections and the dredging of channels in shallow water areas to allow access of construction equipment. The EIS should evaluate alternatives to any activity that would result in an adverse impact to these resources and determine if there are lesser environmentally damaging methods. These sections also should evaluate whether mitigative actions would adequately offset net impacts to EFH and associated fishery resources.

The EIS developed for this project should include a section titled "Mitigation" that contains sufficient information to support a determination of compliance with the Clean Water Act Section 404(b)(1) guidelines and Section 2036 of the Water Resources Development Act of 2007. This includes the joint Environmental Protection Agency/Department of the Army final rule on compensatory mitigation for losses of aquatic resources, issued April 10, 2008, which amends the Clean Water Act guidelines. Perhaps most pertinent therein is the requirement that measures should be taken first to avoid, then minimize, and mitigate and that mitigation plans should include 12 components: 1) objectives; 2) site selection (rationale); 3) site protection instrument; 4) baseline information; 5) determination of credits; 6) mitigation work plan; 7) maintenance plan; 8) performance standards; 9) monitoring requirements; 10) long-term management plan; 11) adaptive management plan; and,12) financial assurances.

We appreciate the opportunity to provide input into the issues that should be evaluated in the EIS for this project. If you have any questions regarding our comments, please contact Mr. Richard Hartman of our Habitat Conservation Division, Baton Rouge office at (225) 389-0508, ext 203.

Sincerely,

Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

c:
FWS, Lafayette
EPA, Dallas
LA DNR, Consistency
F/SER46, Swafford
F/SER4, Dale
Files

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex E

Natural Resources Conservation Service Prime and Unique Farmlands Coordination

USDA

May 16, 2014

Nathan Dayan
RTS Environmental Compliance
US Army Corps of Engineers
New Orleans District
P.O. Box 60267
New Orleans, Louisiana 70160

RE: St. James Parish, West Shore Lake Pontchartrain – Swamp Restoration - USACE

Dear Mr. Dayan:

I have reviewed the above referenced project for potential requirements of the Farmland Protection Policy Act (FPPA) and potential impact to Natural Resources Conservation Service projects in the immediate vicinity.

Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.
The project map and narrative submitted with your request indicates that the proposed construction areas will potentially impact the following prime or unique farmland soils:

CmA - Cancienne silt loam, 0 to 1 percent slopes	RV = 100	Acres = 267.2
CvA – Carville silt loam, 0 to 1 percent slopes	RV = 100	Acres = 6.1
GrA – Gramercy silty clay, 0 to 1 percent slopes	RV = 85	Acres = 50.4
SkA – Schriever clay, 0 to 1 percent slopes	RV = 85	Acres = 24.3

This project has 348 acres prime farmland with a weighted average RV of 97.

Please find attached an AD-1006 Farmland Conversion Impact Rating for Corridor Type Projects with our agencies information completed. Furthermore, we do not predict impacts to NRCS work in the vicinity.

For specific information about the soils found in the project area, please visit our Web Soil Survey at the following location: http://websoilsurvey.nrcs.usda.gov/

For more information on FPPA requirements or the process to receive a Farmland Conversion Impact Rating (Form AD-1006 or CPA-106) please visit the following location:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/fppa/

Please direct all future correspondence to me at the address shown above.

Respectfully,

Kevin Norton
State Conservationist

Enclosure

Natural Resources Conservation Service
State Office
3737 Government Street
Alexandria, Louisiana 71302
Voice: (318) 473-7751 Fax: (318) 473-7626
An Equal Opportunity Provider and Employer

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 05/12/2014
Name of Project West Shore Lake Pontchartrain	Federal Agency Involved US Army Corp of Engineers
Proposed Land Use Swamp Restoration	County and State St. James Parish, Louisiana
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 5/12/14 — Person Completing Form: Mike Lindsey

Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES	NO	Acres Irrigated	Average Farm Size
	☑	☐	—	676 ac.

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount of Farmland As Defined in FPPA
Soybeans	Acres: 61,849 % 40	Acres: 61,849 % 40
Name of Land Evaluation System Used	**Name of State or Local Site Assessment System**	**Date Land Evaluation Returned by NRCS**
St. James Parish LESA	NA	5/16/14

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	348			
B. Total Acres To Be Converted Indirectly	—			
C. Total Acres In Site	348			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	348			
B. Total Acres Statewide Important or Local Important Farmland	—			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.5			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	100			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	97			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)				
2. Perimeter In Non-urban Use	(10)				
3. Percent Of Site Being Farmed	(20)				
4. Protection Provided By State and Local Government	(20)				
5. Distance From Urban Built-up Area	(15)				
6. Distance To Urban Support Services	(15)				
7. Size Of Present Farm Unit Compared To Average	(10)				
8. Creation Of Non-farmable Farmland	(10)				
9. Availability Of Farm Support Services	(5)				
10. On-Farm Investments	(20)				
11. Effects Of Conversion On Farm Support Services	(10)				
12. Compatibility With Existing Agricultural Use	(10)				
TOTAL SITE ASSESSMENT POINTS	160				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form: Eric M. Williams — Date: 05/12/2014

(See Instructions on reverse side)

Form AD-1006 (03-02)

USDA

United States Department of Agriculture

April 1, 2014

Eric Williams
US Army Corp of Engineers
Eric.M.Williams@usace.army.mil

RE: St. John and St. Charles Parishes, LA – West Shore Lake Pontchartrain Levee Update

Dear Mr. Williams:

I have reviewed the above referenced project for potential requirements of the Farmland Protection Policy Act (FPPA) and potential impact to Natural Resources Conservation Service projects in the immediate vicinity.

Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.

The project map and narrative submitted with your request indicates that the proposed construction areas will potentially impact the following prime or unique farmland soils:

CmA – Cancienne silt loam, 0 to 1 percent slopes	16 ac.	
GrA – Gramercy silty clay, 0 to 1 percent slopes	62 ac.	
SkA – Schriever clay, 0 to 1 percent slopes	28 ac	
Cn – Cancienne silty clay loam, frequently flooded	23 ac.	
Total acres prime farmland	129 ac.	RV = 92

Please find attached an NRCS-CPA-106 Farmland Conversion Impact Rating for Corridor Type Projects with our agencies information completed. Furthermore, we do not predict impacts to NRCS work in the vicinity.

For specific information about the soils found in the project area, please visit our Web Soil Survey at the following location: http://websoilsurvey.nrcs.usda.gov/

For more information on FPPA requirements or the process to receive a Farmland Conversion Impact Rating (Form AD-1006 or CPA-106) please visit the following location:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/fppa/

Please direct all future correspondence to me at the address shown above.

Respectfully,

Kevin Norton
State Conservationist

ACTING FOR

Attachment

Natural Resources Conservation Service
State Office
3737 Government Street
Alexandria, Louisiana 71302
Voice: (318) 473-7751 Fax: (318) 473-7626
An Equal Opportunity Provider and Employer

U.S. DEPARTMENT OF AGRICULTURE
Natural Resources Conservation Service

NRCS-CPA-106
(Rev. 1-91)

FARMLAND CONVERSION IMPACT RATING FOR CORRIDOR TYPE PROJECTS

PART I *(To be completed by Federal Agency)*	3. Date of Land Evaluation Request 3/20/13	4. Sheet 1 of 1
1. Name of Project **West Shore Lake Pontchartrain**	5. Federal Agency Involved **U.S. Army Corps of Engineers**	
2. Type of Project **Levee**	6. County and State **St. Charles and St. John the Baptist Parish, LA**	

PART II *(To be completed by NRCS)*	1. Date Request Received by NRCS 3/20/14	2. Person Completing Form Mike Lindsey
3. Does the corridor contain prime, unique statewide or local important farmland? (If no, the FPPA does not apply - Do not complete additional parts of this form). YES ☑ NO ☐		4. Acres Irrigated | Average Farm Size 676
5. Major Crop(s) Soybeans	6. Farmable Land in Government Jurisdiction Acres: 45143 % 33	7. Amount of Farmland As Defined in FPPA Acres: 33193 % 24
8. Name Of Land Evaluation System Used LESA	9. Name of Local Site Assessment System NA	10. Date Land Evaluation Returned by NRCS 4/1/14

PART III *(To be completed by Federal Agency)*	Alternative Corridor For Segment			
	Corridor A	Corridor B	Corridor C	Corridor D
A. Total Acres To Be Converted Directly	385			
B. Total Acres To Be Converted Indirectly, Or To Receive Services				
C. Total Acres In Corridor	385			
PART IV *(To be completed by NRCS) Land Evaluation Information*				
A. Total Acres Prime And Unique Farmland	129			
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.28			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	32			
PART V *(To be completed by NRCS) Land Evaluation Information Criterion Relative value of Farmland to Be Serviced or Converted (Scale of 0 - 100 Points)*	92			
PART VI *(To be completed by Federal Agency) Corridor Assessment Criteria (These criteria are explained in 7 CFR 658.5(c))* — Maximum Points				
1. Area in Nonurban Use — 15				
2. Perimeter in Nonurban Use — 10				
3. Percent Of Corridor Being Farmed — 20				
4. Protection Provided By State And Local Government — 20				
5. Size of Present Farm Unit Compared To Average — 10				
6. Creation Of Nonfarmable Farmland — 25				
7. Availablility Of Farm Support Services — 5				
8. On-Farm Investments — 20				
9. Effects Of Conversion On Farm Support Services — 25				
10. Compatibility With Existing Agricultural Use — 10				
TOTAL CORRIDOR ASSESSMENT POINTS — 160	0	0	0	0
PART VII *(To be completed by Federal Agency)*				
Relative Value Of Farmland (From Part V) — 100	92	0	0	0
Total Corridor Assessment (From Part VI above or a local site assessment) — 160	0	0	0	0
TOTAL POINTS *(Total of above 2 lines)* — 260	92	0	0	0

1. Corridor Selected:	2. Total Acres of Farmlands to be Converted by Project:	3. Date Of Selection:	4. Was A Local Site Assessment Used? YES ☐ NO ☐

5. Reason For Selection:

Signature of Person Completing this Part: | DATE

NOTE: Complete a form for each segment with more than one Alternate Corridor

CORRIDOR - TYPE SITE ASSESSMENT CRITERIA

The following criteria are to be used for projects that have a linear or corridor - type site configuration connecting two distant points, and crossing several different tracts of land. These include utility lines, highways, railroads, stream improvements, and flood control systems. Federal agencies are to assess the suitability of each corridor - type site or design alternative for protection as farmland along with the land evaluation information.

(1) How much land is in nonurban use within a radius of 1.0 mile from where the project is intended?
More than 90 percent - 15 points
90 to 20 percent - 14 to 1 point(s)
Less than 20 percent - 0 points

(2) How much of the perimeter of the site borders on land in nonurban use?
More than 90 percent - 10 points
90 to 20 percent - 9 to 1 point(s)
Less than 20 percent - 0 points

(3) How much of the site has been farmed (managed for a scheduled harvest or timber activity) more than five of the last 10 years?
More than 90 percent - 20 points
90 to 20 percent - 19 to 1 point(s)
Less than 20 percent - 0 points

(4) Is the site subject to state or unit of local government policies or programs to protect farmland or covered by private programs to protect farmland?
Site is protected - 20 points
Site is not protected - 0 points

(5) Is the farm unit(s) containing the site (before the project) as large as the average - size farming unit in the County ? (Average farm sizes in each county are available from the NRCS field offices in each state. Data are from the latest available Census of Agriculture, Acreage or Farm Units in Operation with $1,000 or more in sales.)
As large or larger - 10 points
Below average - deduct 1 point for each 5 percent below the average, down to 0 points if 50 percent or more below average - 9 to 0 points

(6) If the site is chosen for the project, how much of the remaining land on the farm will become non-farmable because of interference with land patterns?
Acreage equal to more than 25 percent of acres directly converted by the project - 25 points
Acreage equal to between 25 and 5 percent of the acres directly converted by the project - 1 to 24 point(s)
Acreage equal to less than 5 percent of the acres directly converted by the project - 0 points

(7) Does the site have available adequate supply of farm support services and markets, i.e., farm suppliers, equipment dealers, processing and storage facilities and farmer's markets?
All required services are available - 5 points
Some required services are available - 4 to 1 point(s)
No required services are available - 0 points

(8) Does the site have substantial and well-maintained on-farm investments such as barns, other storage building, fruit trees and vines, field terraces, drainage, irrigation, waterways, or other soil and water conservation measures?
High amount of on-farm investment - 20 points
Moderate amount of on-farm investment - 19 to 1 point(s)
No on-farm investment - 0 points

(9) Would the project at this site, by converting farmland to nonagricultural use, reduce the demand for farm support services so as to jeopardize the continued existence of these support services and thus, the viability of the farms remaining in the area?
Substantial reduction in demand for support services if the site is converted - 25 points
Some reduction in demand for support services if the site is converted - 1 to 24 point(s)
No significant reduction in demand for support services if the site is converted - 0 points

(10) Is the kind and intensity of the proposed use of the site sufficiently incompatible with agriculture that it is likely to contribute to the eventual conversion of surrounding farmland to nonagricultural use?
Proposed project is incompatible to existing agricultural use of surrounding farmland - 10 points
Proposed project is tolerable to existing agricultural use of surrounding farmland - 9 to 1 point(s)
Proposed project is fully compatible with existing agricultural use of surrounding farmland - 0 points

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex F

State Historic Preservation Officer (SHPO) and
Tribal Coordination Letters

Preserving America's Heritage

May 16, 2014

Ms. Joan Exnicios
Chief, Environmental Branch
U.S. Army Corps of Engineers
New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

REF: West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction System

Dear Ms. Exnicios:

Enclosed is the executed Programmatic Agreement for the referenced program. By carrying out the terms of the Agreement, the Corps of Engineers will have fulfilled its responsibilities under Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's regulations.

If you have any questions, please call Dr. Tom McCulloch at 202-606-8554 or via email at tmcculloch@achp.gov

Sincerely,

Caroline D. Hall
Assistant Director
Federal Property Management Section
Office of Federal Agency Programs

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
West Shore Lake Pontchartrain Hurricane and
Storm Damage Risk Reduction System

WHEREAS, historically, residents and businesses of St. Charles, St. John the Baptist, and St. James Parishes, Louisiana have suffered major damage as a result of storms and hurricanes. Recent hurricanes that have impacted the area include Hurricanes Katrina and Rita in 2005, Hurricanes Gustav and Ike in 2008, and Hurricane Isaac in 2012, which caused a storm surge in the area that threatened lives and damaged more than 7,000 homes; and

WHEREAS, the U.S. Congress recognized the need for a hurricane and storm damage risk reduction project in the area with two Congressional resolutions to authorize its study. The first was adopted on July 29, 1971 by the U.S. House of Representatives Committee on Public works.

“RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Lake Pontchartrain and Vicinity, Louisiana, published as House Document No. 231, 89th Congress, First Session, and other pertinent reports, with a view to determining whether modifications to the recommendations contained therein are advisable at this time, with particular reference to providing additional levees for hurricane protection and flood control in St. John the Baptist Parish and that part of St. Charles Parish west of the Bonnet Carré Spillway."

The U.S. Senate Committee on Public Works adopted a resolution on September 20, 1974.

“RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, that the Board for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Lake Pontchartrain and Vicinity, Louisiana, published as House Document No. 231, 89th Congress, First Session, and other pertinent reports, with a view to determining whether modifications to the recommendations contained therein are advisable at this time, for hurricane protection and flood control in St. James Parish."

WHEREAS, the United States Army Corps of Engineers (USACE) has been working with state and local officials to study potential solutions to reduce

damage caused by hurricane and tropical storm surge in the three-parish area. This study has come to be known as the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study; and

WHEREAS, the USACE has determined that the WSLP project is an "Undertaking" pursuant to the National Historic Preservation Act of 1966 (16 U.S.C. 470), as amended, (NHPA), and may have an adverse effect on properties included or eligible for inclusion in the National Register of Historic Places (NRHP); and

WHEREAS, the USACE has elected to fulfill its obligations under Section 106 of the NHPA through the execution and implementation of a Programmatic Agreement (this Agreement) as provided in 36 CFR 800.14(b); and

WHEREAS, the USACE notified the Advisory Council on Historic Preservation (ACHP) of the potential for this undertaking to adversely affect historic properties pursuant to the ACHP's implementing regulations (36 CFR Part 800); and

WHEREAS, the ACHP accepted the invitation to participate in consultation to develop this Agreement and to seek ways to avoid, minimize, or mitigate adverse effects on historic properties; and

WHEREAS, the USACE consulted with the Louisiana State Historic Preservation Officer (LA SHPO), Tribal Historic Preservation Officers (THPO) and federally recognized Indian Tribes as defined under 36 CFR 800.16(m) (Tribes), and other appropriate consulting parties in developing this Agreement in order to define efficient and cost effective processes for taking into consideration the effects of the WSLP project upon historic properties pursuant to 36 CFR 800.14(b); and

WHEREAS, the USACE acknowledges Tribes as sovereign nations which have a unique government-to-government relationship with the federal government and its agencies; USACE further acknowledges its Trust Responsibility to those Tribes; and

WHEREAS, the USACE made a reasonable and good faith effort to identify any Tribes that may attach religious and cultural significance to historic properties that may be affected by the undertaking; and

WHEREAS, the USACE has invited the Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Quapaw Tribe of Oklahoma, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and the Tunica-Biloxi Tribe of Louisiana to consult in the development of this Agreement. The Quapaw Tribe of Oklahoma and the Seminole Tribe of Florida have independently determined that

the undertaking is not within their tribe's area of interest and do not wish to comment; and

WHEREAS, the USACE will invite any interested Tribe who participates in the development of this Agreement to sign this Agreement as an Invited Signatory Party, and those Tribes not requesting to sign this Agreement as an Invited Signatory Party will be invited to sign as a Concurring Party; and

WHEREAS, the USACE has involved the public through the National Environmental Policy Act (NEPA) process, which affords all persons, organizations and government agencies the right to review and comment on proposed major federal actions that are evaluated by a NEPA document. Public meetings to collect input during planning were held in January 2009, February 2011, November 2012, April 2013, and May 2013. On August 23, 2013, the USACE released an Integrated Draft Feasibility Report and Environmental Impact Statement for the WSLP project (Draft Report) to the public for a review period of forty-five (45) calendar days. The public review period was extended an additional 14 days to October 22, 2013 as compensation for Federal Government shutdown of 2013. This document included a general discussion of cultural resources within the study area. Public hearings of the Draft Report were held on September 10, September 17, and November 2, 2013. Comments received during the 59-day review and the public hearings are being incorporated into the Integrated Final Feasibility Report and Environmental Impact Statement; and

WHEREAS, the USACE has taken appropriate measures to identify other parties that may be interested specifically in the development of this Agreement, by notification to the Parish Presidents of St. James, St. John the Baptist, and St. Charles Parishes, as well as to four (4) historical associations within these three parishes, and has invited such parties to participate in the development and execution of this Agreement; and

WHEREAS, the USACE has also taken steps to notify the wider public with newspaper announcements in the Times-Picayune of New Orleans, and NOLA.com of New Orleans. The USACE will furthermore take appropriate steps to involve and notify parties, as appropriate, during the implementation of the terms of this Agreement; and

WHEREAS, the Louisiana Coastal Protection and Restoration Authority Board (CPRAB) is a local sponsor for WSLP project and has participated in the development of this Agreement and will be invited to sign this Agreement as a Concurring Party. Any additional local sponsors for the WSLP project will also be invited to sign this Agreement as a Concurring Party; and

NOW, THEREFORE, the USACE, ACHP, and LA SHPO agree that the implementation of the following stipulations will evidence that the USACE has taken into account the effects of the WSLP project upon historic properties.

STIPULATIONS

The USACE shall adhere to the process and protocols set forth in this Agreement.

I. Correspondence

Electronic mail (email) will serve as the official correspondence method for all communications regarding this Agreement and its provisions. See Appendix A for a list of contacts and email addresses. Contact information in Appendix A may be updated as needed without an amendment to this Agreement. It is the responsibility of each signatory to immediately inform the USACE of any change in name, address, email address, or phone number of any point-of-contact. The USACE will forward this information to all signatories by email. Failure of any party to this Agreement to notify the USACE of any change to a point-of-contact's information shall not be grounds for asserting that notice of a proposed action was not received.

A. All standard response timeframes established by 36 CFR Part 800 will apply to this Agreement, unless an alternative response timeframe is agreed to by the LA SHPO and Tribes. The USACE may request expedited review by the LA SHPO and Tribes on a case by case basis. Such expedited review period shall not be less than 10 working days.

II. Tribal Consultation

A. The Chitimacha Tribe of Louisiana, the Choctaw Nation of Oklahoma, and the Coushatta Tribe of Louisiana participated in the development of this Agreement and will sign this Agreement as an Invited Signatory Party.

B. The Mississippi Band of Choctaw Indians participated in the development of this Agreement and will be invited to sign this Agreement as a Concurring Party.

C. The Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Jena Band of Choctaw Indians, Seminole Nation of Oklahoma, and the Tunica-Biloxi Tribe of Louisiana will be invited to sign this Agreement as a Concurring Party.

D. The Seminole Tribe of Florida and the Quapaw Tribe of Oklahoma have independently determined that the undertaking is not within their tribe's area of interest and they have elected not to consult further in connection with the WSLP project.

E. The USACE shall make a reasonable and good faith effort to identify any additional Tribes that might attach religious and cultural significance to historic properties in the area of potential effects (APE) for the WSLP project.

F. The USACE shall consult with Tribes that are invited to sign this Agreement as Invited Signatory Parties and Tribes that are invited to sign this agreement as Concurring Parties, as well as any other Tribe that requests in writing to be a consulting party (collectively, “Consulting Tribes”).

G. The USACE will provide the Consulting Tribes with an executed copy of this Agreement and with copies of all plans, determinations, and findings provided to the LA SHPO.

III. Public Involvement

A. The USACE, in consultation with the LA SHPO, shall continue to identify and provide members of the public likely to be interested in the effects of the WSLP project upon historic properties with a description of the undertaking and the provisions of this Agreement.

B. Specific cultural resources data will not be released to the general public or become released as part of NEPA documents.

C. To the extent permitted under applicable federal laws and regulations (e.g., Section 304 of the NHPA, Section 9 of the Archaeological Resources Protection Act [ARPA]), the USACE will release to the public, documents developed pursuant to this Agreement, effects determinations, and Interim Progress Reports.

IV. Other Consulting Parties

A. Any member of the public expressing an interest in the effects of this undertaking on historic properties, may become a consulting party by submitting a written request to USACE.

B. The USACE, in consultation with the LA SHPO, will continue efforts during the duration of this Agreement to identify other parties with demonstrated interests in the preservation of historic properties.

C. The USACE will document the consulting parties in the consultation process for the WSLP project and maintain it as part of the administrative record.

D. If any dispute arises about the right to be recognized as a consulting party, the USACE will contact the ACHP and provide all appropriate documentation. The ACHP will participate in the resolution of the issue.

V. Identification, Evaluation, and Assessment of Effects Determinations

A. The USACE, in consultation with the LA SHPO and Consulting Tribes, will define and document the geographic areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist, referred to as an area of potential effects (APE). Because WSLP contains borrow sources and mitigation areas that are spatially distinct from the risk reduction system, there will be multiple APE (collectively, the WSLP APE). Each APE will assist in identifying the potential for direct, indirect, and cumulative effects upon historic properties. The reasonable and good faith identification and evaluation efforts will be limited to the identified WSLP APE.

B. WSLP APE are defined at this time to include areas that may be directly or indirectly impacted by:

1. A 55-foot wide and 18.27-mile long levee to be constructed in St. John the Baptist Parish, including its associated features (i.e., pump stations, canals, and drainage structures), as well as activities associated with construction (i.e., access roads and staging areas);

2. Three (3) 20-foot wide berms enclosing three residential communities located in St. James Parish with a combined total length of approximately 7 miles;

3. Installation of 145 flap gates on existing culverts below Highway 3125.

C. Borrow sources and mitigation sites are not yet fully defined, and will be coordinated for purposes of defining the APE by the USACE, LA SHPO, and Consulting Tribes. Additional areas of the WSLP APE will be identified as necessary.

D. Following the delineation of final WSLP APE components, the USACE will conduct a reasonable and good faith effort to identify historic properties located within the WSLP APE. Level of survey to be conducted within the APE and methodology will be developed in consultation with the LA SHPO and

Consulting Tribes, in a manner equivalent to the Section 106 Process of NHPA and equivalent to Reconnaissance or Phase I Investigations required by the Louisiana Division of Archaeology. Areas that are inaccessible or are determined to possess a low probability for containing historic properties may be excluded from survey after consultation with the LA SHPO and Consulting Tribes.

E. The USACE will ensure that the results of identification efforts are documented in reports that meet the standards of the Louisiana Division of Archaeology, and will ensure that the reports are submitted to the LA SHPO and Consulting Tribes for review and comment. The USACE will ensure that the comments provided by the LA SHPO and Consulting Tribes are addressed and incorporated into a final report.

F. The USACE will consult with the LA SHPO and Consulting Tribes on the eligibility of any properties identified during the identification effort. For any properties determined not eligible for nomination to the NRHP, no further consideration will be required under the terms of this Agreement. For those properties determined eligible for nomination, the USACE will proceed in accordance with Stipulation VI. For those properties whose eligibility for the NRHP cannot be determined on the basis of the identification effort, the USACE will consult with the LA SHPO and Consulting Tribes to determine if the proposed project can avoid the properties. If the properties can be avoided, the USACE will proceed as in Stipulation VI. If the properties cannot be avoided, the USACE will ensure that additional investigations to evaluate each property's eligibility for nomination will be undertaken.

G. The USACE will ensure that the results of the evaluation efforts are documented in reports that meet the standards of the Louisiana Division of Archaeology and will ensure that the reports are submitted to the LA SHPO and Consulting Tribes for review and comment. The USACE will ensure that the comments provided by the LA SHPO and Consulting Tribes are addressed and incorporated into a final report.

H. The USACE will consult with the LA SHPO and Consulting Tribes on the eligibility of the properties assessed during the evaluation effort. For any properties determined not eligible for nomination to the NRHP, no further consideration will be required. For those properties determined eligible for nomination, the USACE will proceed in accordance with Stipulation VII.

I. In the event of disagreement between the USACE, LA SHPO, and/or Consulting Tribes concerning the eligibility of a property for listing in the NRHP under 36 CFR Part 60, the USACE shall request a formal determination of eligibility for that property from the Keeper of the NRHP (Keeper). The determination by the Keeper will serve as the final decision regarding the NRHP eligibility of the property.

VI. Coordination of Effects Determinations

A. The USACE shall evaluate the effects of a project activity on historic properties in a holistic manner and will not segment activities. In the event the USACE determines that any aspect of the project activity will have an effect or adverse effect on a historic property within the WSLP APE, the entire project activity will be reviewed accordingly.

B. Consultation under this Agreement will be concluded for USACE findings of *no historic properties affected* and *no adverse effect* when the LA SHPO and Consulting Tribes have been provided the opportunity to review and comment on the written documentation and either concur or do not object within 30 days of receipt of the USACE finding, and subject to the provisions of this Agreement.

C. Following submission of written documentation to the LA SHPO and Consulting Tribes, the USACE may propose a finding of *no adverse effect with conditions*, as appropriate. Such conditions may include, but are not limited to:

1. Avoidance and/or preservation-in-place of historic properties;

2. Modifications or conditions to ensure consistency with the Secretary of Interior's Standards for the Treatment of Historic Properties and applicable guidelines.

D. In the event of an objection by the LA SHPO, Consulting Tribes or other consulting parties regarding the USACE’s findings of *no historic properties affected*, findings of *no adverse effect*, and findings of *no adverse effect with conditions*, the USACE shall seek to resolve such objection through consultation in accordance with procedures outlined in Stipulation XII.

VII. Resolution of Adverse Effects

A. In the event that the USACE, in consultation with the LA SHPO and Consulting Tribes, determines that the implementation of a project activity may result in an adverse effect to historic properties (as defined in 36 CFR 800.5(a)(1) and (2) of the ACHP's regulations), the USACE shall notify the ACHP, LA SHPO, Consulting Tribes, other consulting parties and the public. If the project activity will affect a National Historic Landmark, USACE shall also notify the National Park Service (NPS). The notification of adverse effect shall include the following documentation, subject to the confidentiality provisions of 36 CFR 800.6:

1. Summary description of the activity area;

2. Summary of identification efforts in accordance with this agreement;

3. Summary analysis of effects to historic properties;

4. Summary of alternatives considered to avoid or reduce adverse effects;

5. Proposed mitigation measures in accordance with Stipulation VIII when adverse effects cannot be avoided or conditioned to reach a determination of no adverse effect; and

6. Request for ACHP comment and involvement, as appropriate.

B. The ACHP, LA SHPO, Consulting Tribes, and any additional consulting parties, including the NPS, as appropriate, shall be afforded an opportunity to review and to comment on the adverse effect notification for a period of thirty (30) calendar days after receipt of the adverse effect notification.

C. Should the USACE, LA SHPO, and Consulting Tribes disagree on the proposed mitigation measures, the USACE shall seek to resolve such objection through consultation in accordance with Stipulation XII.

VIII. Standard Mitigation Measures

A. The USACE, in coordination with the ACHP, LA SHPO, Consulting Tribes, and other consulting parties, will identify standard mitigation measures for adverse effects to historic properties. Standard mitigation measures will be tailored to the significance of the historic property, and may include, but are not necessarily limited to, one or more of the following:

1. Public Interpretation;

2. Documentation consistent with the Level II Standards of the Historic American Building Survey/Historic American Engineering Record (HABS/HAER);

3. Historical, Architectural or Archeological Monographs;

4. Rehabilitation of historic buildings in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Part 68);

5. Off-site mitigation, including acquisition of property or preservation easements on property, as appropriate and legal, containing threatened resources of comparable significance in circumstances where there is an imminent need to proceed with construction activity and it is in the public interest;

6. Ethnographic studies;

7. Studies of traditional cultural properties;

8. Relocation of historic properties to sites approved by the LA SHPO as possessing similar overall character; and

9. Data recovery for archeological properties.

B. In the event that the ACHP, LA SHPO, and/or Consulting Tribes determine that standard mitigation measures are not adequate or appropriate to resolve adverse effects, the USACE, LA SHPO, and Consulting Tribes will consult to negotiate additional mitigation measures. Other consulting parties may express their concerns regarding mitigation measures through written comments submitted to any of the signatories to the Agreement.

C. Once the USACE, ACHP, LA SHPO, and/or Consulting Tribes agree to the terms of the mitigation, such agreement will be formalized through an MOA executed and implemented pursuant to 36 CFR 800.6(c). Such MOA shall be forwarded to all signatories to this Agreement. If there is a disagreement that cannot be resolved, the formal dispute provisions at Stipulation XII will be implemented.

IX. Curation

The USACE will ensure that all collections and associated records retrieved or created during the life of this Agreement are curated in accordance with 36 CFR Part 79.

X. Unanticipated Discoveries and Effects

A. In the event that the USACE discovers a previously unidentified cultural resource, including but not limited to archeological sites, standing structures, human remains, and properties of traditional religious and cultural significance to Tribes, during the execution of the project, the USACE immediately shall secure the immediate jobsite by the most appropriate quickly available means, to include but not necessarily limited to a 50-foot radius buffer around the unexpected discovery, and suspend work in that buffered area of the affected resource. The USACE shall immediately notify the LA SHPO, Consulting Tribes, and additional consulting parties, as appropriate, of the finding. Any previously unidentified cultural resource will be treated as though it is eligible for the NRHP until other determination may be made. If consulting parties agree that the cultural resource is not eligible for the NRHP, then suspension of work will end. If consulting parties agree that the cultural resource is eligible for the NRHP, then the USACE, in consultation with the LA SHPO and Consulting Tribes, will develop a treatment plan or Standard Mitigation Measures agreement in accordance with Stipulation VIII. USACE will implement the plan or Standard Mitigation Measures agreement once approved by the LA SHPO, Consulting Tribes, and additional consulting parties, as appropriate. If there is a disagreement that cannot be resolved, the formal dispute provisions at Stipulation XII will be implemented.

B. In the event that the USACE is notified of a previously unidentified archaeological property on federal or tribal land during the execution of any of the undertakings, the USACE will ensure that procedures established by ARPA 1979 (Public Law

96-95; 16 U.S.C. 470aa-mm), as amended, and implementing regulations (43 CFR Part 7) will be followed.

C. The USACE shall insure that all contractors are made aware of the requirements of this Agreement. Language of Stipulation X shall be included in Construction Plans and Specifications. In the event that a contractor discovers a previously unidentified cultural resource, the contractor shall immediately notify the USACE and refrain from further project activities within a minimum of 50 feet from the discovery (50-foot radius no work buffer), and shall take reasonable efforts to avoid and minimize harm to the cultural resource. The USACE shall implement any additional measures thought necessary to secure the historic property for safety and security concerns.

D. In the event that previously unidentified effects to historic properties are identified following the completion of work within an activity area, any party may provide the USACE with evidence of such effects for a period of twelve (12) months from the completion of the affecting work. The USACE, in consultation with the LA SHPO, Consulting Tribes, and ACHP, as appropriate, will review and if determined necessary will develop a treatment plan or Standard Mitigation Measures agreement in accordance with Stipulation VIII.

E. If the USACE, LA SHPO, and/or Consulting Tribes cannot agree on an appropriate course of action to address the discovery situation, the USACE shall initiate the dispute resolution process set forth in Stipulation XII.

XI. Discovery of Human Remains

A. Language of Stipulation XI shall be included in Construction Plans and Specifications, to offer fullest knowledge of the importance therein.

B. When human remains or indications of a burial are discovered, the individual(s) who made the discovery shall immediately notify the local law enforcement and the USACE, New Orleans District. All work shall cease within a minimum of 50 feet from the discovery (50-foot radius no work buffer) until and unless determined otherwise in consultation according to this Agreement.

C. The USACE may authorize the activity in the direct discovery areas to resume, following the completion of all necessary steps as outlined below.

D. In the event that the USACE is notified of a previously unidentified burial, including burial sites, human skeletal remains, or burial artifacts, on private or state land during the execution of any of the Undertakings, the USACE will ensure that the procedures established in the Louisiana Unmarked Human Burial Sites Preservation Act (La. R.S. 8:671-681) will be followed.

E. In the event that the USACE is notified of a previously unidentified burial, including burial sites, human remains or funerary objects, on federal or tribal land during the execution of any of the undertakings, the USACE will ensure that procedures established by ARPA 1979 (Public Law 96-95; 16 U.S.C. 470aa-mm), as amended, and implementing regulations (43 CFR Part 7) will be followed.

F. In the event that the USACE is notified of a previously unidentified American Indian burial, including burial sites, human remains or funerary objects, on federal or tribal land during the execution of any of the undertakings, the USACE will ensure that procedures established by the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 and the regulations that implement it (43 CFR Part 10) will be followed.

G. The USACE shall have an archaeologist immediately survey or resurvey the general area where the remains were found to determine the nature of the remains and evaluate the possibility of preserving the remains in place or whether they will need to be exhumed/moved. Tribes likely to have a cultural affiliation with the remains will be notified by telephone immediately in accordance with 43 CFR Part 10.4(b). If possible, Tribal representative(s) shall be present to advise on appropriate treatment of the exposed remains and on the most appropriate long-term solution.

H. The USACE shall provide information collected on the nature of the remains and a recommended plan of action pursuant to 43 CFR 10.5(e) within five (5) working days to the Consulting Tribes and the LA SHPO. The USACE shall consult with all relevant parties to determine the appropriate course of action with regard to the human remains and any accompanying artifacts, grave goods, or funerary objects.

I. All signatories agree that the most appropriate treatment, if feasible, is to protect the remains and permanently preserve the burial in situ.

J. If the USACE, after consultation, determines that protection, avoidance, or repair is not feasible, disinterment shall be conducted in accordance with methods and procedures developed in accordance with the appropriate federal and state laws and in consultation with the Consulting Tribes and the LA SHPO.

XII. Dispute Resolution

A. Except for the resolution of eligibility issues, as set forth in Stipulation V, should the LA SHPO, Consulting Tribes, or a member of the public disagree on the implementation of the provisions of this agreement, they will notify the USACE, who will seek to resolve such objection through consultation.

B. If the dispute cannot be resolved through consultation, the USACE shall forward all documentation relevant to the dispute to the ACHP, including any proposed resolution identified during consultation. Within seven (7) calendar days after receipt of all pertinent documentation, the ACHP may:

1. Provide the USACE with recommendations to take into account in reaching final decision regarding the dispute; or

2. Notify the USACE that it will comment pursuant to 36 CFR 800.7(c) and provide formal comments within twenty-one (21) calendar days.

C. Any recommendation or comment provided by the ACHP will be understood to pertain only to the subject of the dispute, and the USACE's responsibilities to fulfill all actions that are not subject of the dispute will remain unchanged.

D. If the ACHP does not provide the USACE with recommendations or notification of its intent to provide formal comments within seven (7) calendar days, the USACE may assume that the ACHP does not object to its recommended approach and it will proceed accordingly.

XIII. Administration, Effect, and Duration of this Agreement

A. This Agreement will be signed in counterparts and shall take effect upon execution by the ACHP, USACE, and LA SHPO.

B. This Agreement will remain in effect for ten (10) years from the date of execution, unless extended for a two-year period by written agreement negotiated by all signatories.

C. All signatories to this Agreement shall meet annually to evaluate the effectiveness of this Agreement, beginning one (1) year after the date of execution. The USACE shall coordinate such annual meetings following the execution of this Agreement. At each annual meeting, held in manner and location as mutually agreed upon by all signatories, the effectiveness of the Stipulations of this Agreement shall be discussed. After five (5) years, all signatories will begin the discussion to consider any cumulative effects as discussed by Stipulation XIV.

XIV. Comprehensive Review

A. Upon completion of the construction activities for the WSLP project, the USACE will analyze the undertaking holistically to identify cumulative effects upon historic properties. Cumulative effects are those coincident effects on specific resources of all related activities, not just the proposed actions governed by the Stipulations of this Agreement.

B. The USACE, in consultation with the signatories to this Agreement, shall identify and implement additional mitigation measures to address adverse cumulative effects, as appropriate. If there is a disagreement that cannot be resolved, the formal dispute provisions at Stipulation XII will be implemented.

C. Measures to address adverse cumulative effects shall be documented in a report that meets the standards of the Louisiana Division of Archaeology and will be submitted to the LA SHPO and Consulting Tribes for review and comment. The final cumulative report shall be distributed to the signatories to this Agreement, as well as any additional consulting parties.

XV. Amendment and Termination

A. Notwithstanding any provision of this Agreement, USACE, ACHP, LA SHPO, and Invited Signatory Parties may request that it be amended, whereupon these parties will consult to consider such amendment. The USACE will facilitate such consultation within thirty (30) days of receipt of the written request. Any amendment will be in writing and will be signed by the USACE, ACHP, LA SHPO, and Invited Signatory Parties, and shall be effective on the date of the final signature.

B. Any Invited Signatory Party may withdraw its participation in this Agreement by providing thirty (30) days advance written notification to all other parties. In the event of withdrawal by one Invited Signatory Party, the Agreement will remain in effect for the other signatories.

C. The Agreement may be terminated in accordance with 36 CFR Part 800. Any party requesting termination of this Agreement shall provide thirty (30) days advance written notification to all other signatories.

Execution of this Agreement by the ACHP, USACE, and LA SHPO and implementation of its terms, evidences that the USACE has taken into account the effects of the WSLP project upon historic properties and has afforded the ACHP an opportunity to comment.

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
West Shore Lake Pontchartrain Hurricane and
Storm Damage Risk Reduction System

Execution of this Agreement by the ACHP, USACE, and LA SHPO and implementation of its terms, evidences that the USACE has taken into account the effects of the WSLP project upon historic properties and has afforded the ACHP an opportunity to comment.

Signatory:

United States Army Corps of Engineers

By: Richard L. Hansen Date: 5/15/14
Richard L. Hansen
Colonel, U.S. Army
District Commander

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
West Shore Lake Pontchartrain Hurricane and
Storm Damage Risk Reduction System

Execution of this Agreement by the ACHP, USACE, and LA SHPO and implementation of its terms, evidences that the USACE has taken into account the effects of the WSLP project upon historic properties and has afforded the ACHP an opportunity to comment.

Signatory:

Louisiana State Historic Preservation Officer

By: Pam Breaux Date: 5-15-14

Pam Breaux
Louisiana State Historic Preservation Officer
Louisiana Office of Cultural Development

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
West Shore Lake Pontchartrain Hurricane and
Storm Damage Risk Reduction System

Execution of this Agreement by the ACHP, USACE, and LA SHPO and implementation of its terms, evidences that the USACE has taken into account the effects of the WSLP project upon historic properties and has afforded the ACHP an opportunity to comment.

Signatory:

Advisory Council on Historic Preservation

By: John M. Fowler Date: 5/16/14
John M. Fowler
Executive Director
Advisory Council on Historic Preservation

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
West Shore Lake Pontchartrain Hurricane and
Storm Damage Risk Reduction System

Invited Signatory Party:

Chitimacha Tribe of Louisiana

By: John Paul Darden Date: 6-25-14
John Paul Darden, Chairman

APPENDIX A
CONTACT INFORMATION

U.S. Army Corps of Engineers, New Orleans District
Richard L. Hansen
Colonel, U.S. Army
District Commander
P.O. Box 60267
New Orleans, LA 70160
(504) 862-2077

Paul Hughbanks – Project Archaeologist
U.S. Army Corps of Engineers, RPEDS
P.O. Box 60267
New Orleans, LA 70160
(504) 862-1100
paul.j.hughbanks@usace.army.mil

Advisory Council on Historic Preservation
John Fowler, Executive Director
1100 Pennsylvania Avenue NW, Suite 803
Washington, DC 20004
(202) 606-8503
achp@achp.gov

State Historic Preservation Officer
Pam Breaux, SHPO
Department of Culture, Recreation and Tourism
Louisiana State Historic Preservation Office
1051 N. Third Street, Room 319
Baton Rouge, LA 70802
(225) 342-8170
section106@crt.la.gov

Chitimacha Tribe of Louisiana
John Paul Darden, Chairman
Chitimacha Tribe of Louisiana
P.O. Box 661
Charenton, LA 70523

Kimberly S. Walden
Cultural Director/Tribal Historic Preservation Officer
Chitimacha Tribe of Louisiana
P.O. Box 661
Charenton, LA 70523
(337) 923-9923
kswalden@chitimacha.gov

Choctaw Nation of Oklahoma
Gregory E. Pyle, Chief
Attn: Choctaw Nation Historic Preservation Department
Choctaw Nation of Oklahoma
P.O. Box 1210
Durant, Oklahoma 74702-1210

Ian Thompson
Director/Tribal Historic Preservation Officer
P.O. Box 1210
Durant, OK 74702-1210
(800) 522-6170, Ext. 2133
ithompson@choctawnation.com

Coushatta Tribe of Louisiana
Linda Langley
Tribal Historic Preservation Officer
Heritage Department
Coushatta Tribe of Louisiana
P.O. Box 10
Elton, LA 70532
(337) 584-1560
llangley@mcneese.edu

Michael Tarpley
Deputy Tribal Historic Preservation Officer
Heritage Department
Coushatta Tribe of Louisiana
P.O. Box 10
Elton, LA 70532
(318) 709-8488
kokua.aina57@gmail.com

Mississippi Band of Choctaw Indians
Phyliss J. Anderson, Chief
Mississippi Band of Choctaw Indians
P.O. Box 6257
Choctaw, MS 39350

Kenneth H. Carleton
Tribal Historic Preservation Officer/Archaeologist
Mississippi Band of Choctaw Indians
(601) 650-7316
kcarleton@choctaw.org

Alabama-Coushatta Tribe of Texas
Carlos Bullock, Chairman
Alabama-Coushatta Tribe of Texas
571 State Park Rd 56
Livingston, TX 77351

Bryant J. Celestine
Historic Preservation Officer
Alabama-Coushatta Tribe of Texas
571 State Park Rd 56
Livingston, TX 77351
(936) 563-1181
celestine.bryant@actribe.org

Caddo Nation of Oklahoma
Brenda Shemayme Edwards, Chairwoman
Caddo Nation of Oklahoma
P.O. Box 487
Binger, OK 73009

Robert Cast
Tribal Historic Preservation Officer
Caddo Nation of Oklahoma
P.O. Box 487
Binger, OK 73009
(405) 656-2344, Ext. 245
rcast@caddonation.org

Jena Band of Choctaw Indians
B. Cheryl Smith, Principal Chief
Jena Band of Choctaw Indians
P.O. Box 14
Jena, LA 71342

Dana Masters
Tribal Historic Preservation Officer
Jena Band of Choctaw Indians
P.O. Box 14
Jena, LA 71342
(318) 992-1205
jbc.thpo106@aol.com

Seminole Nation of Oklahoma
Leonard M. Harjo, Principal Chief
Seminole Nation of Oklahoma
P.O. Box 1498
Wewoka, OK 74884

Natalie Deere
Tribal Historic Preservation Officer
Historic Preservation Office
Seminole Nation of Oklahoma
P.O. Box 1498
Wewoka, OK 74884
(405) 303-2683, Ext. 7001
harjo.n@sno-nsn.gov

Tunica-Biloxi Tribe of Louisiana
Joey Barbry, Chairman
Tunica-Biloxi Tribe of Louisiana
P.O. Box 1589
Marksville, LA 71351

Earl J. Barbry, Jr.
Cultural Director
Tunica-Biloxi Tribe of Louisiana
P.O. Box 1589
Marksville, LA 71351
(318) 240-6451
earlii@tunica.org

Coastal Protection and Restoration Authority Board
Jerome Zeringue, Chair
P.O. Box 44027
Baton Rouge, LA 70804

Elizabeth Davoli,
Coastal Resources Scientist Manager
Environmental Section, Planning & Research Division
Coastal Protection and Restoration Authority
450 Laurel Street
Baton Rouge, LA 70801
(225) 342-4616
Elizabeth.Davoli@la.gov

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

February 27, 2014

Regional Planning and
Environment Division, South
New Orleans Environmental Branch

Reid Nelson, Director
Office of Federal Agency Programs
Advisory Council on Historic Preservation
Old Post Office
1100 Pennsylvania Ave., NW, Suite 809
Washington, D.C. 20004

Dear Mr. Nelson:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), is consulting for development of a Programmatic Agreement (PA) for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction System (WSLP) Study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate.

The proposed undertakings of the WSLP Study have the potential to effect historic properties. The WSLP Study was first authorized in 1971 and experienced many variations and delays, but now finds further development to be directed by the USACE SMART Feasibility Study Process. A draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study is available for review at http://www.mvn.usace.army.mil/Portals/56/docs/PD/Projects/WSLP/WSLPFINAL.pdf.

The CEMVN is currently funding a cultural resources survey for an approximately 18.5 mile, 550-foot wide, proposed levee corridor (TSP C) (to include construction, adjacent drainage ditch reservoirs, and Right-of-Way), that is the largest single component of the WSLP study. This levee corridor is immediately adjacent to previous cultural resource surveys (as per Louisiana SHPO files) with negative findings, for approximately 10 linear miles. Approximately 1.8 miles of levee corridor pass through or adjacent to cultural resource site 16SJB68 (Angelina Plantation) near the Mississippi River. This site received extensive cultural resources survey in 2012 (Louisiana Site Report 22-4288), and did not locate National Register of Historic Places (NRHP) eligible resources within the proposed levee corridor. Remaining areas of corridor that remain unsurveyed are within seasonally wet lands not conducive to recoverable human activity or preserved cultural resources. No other cultural resources have been recorded within 1 miles of the TSP C levee corridor. It is anticipated that any previously unrecorded cultural resource will be located by the current survey underway for the WSLP study.

Remaining undertakings of the WSLP Study are defined as "non-structural" and were not sufficiently designated in time to be included within the currently-conducted cultural resources survey, but are thought to be similarly low-probability to affect cultural resources. Existing Louisiana Highway 3125 has an elevated roadway, and will serve as a low berm to prevent storm water from affecting any resources to its south. A series of flap gates will be integrated under the roadway to allow natural water-flow as necessary and not artificially create flood damages. Site 16SJ1 is a prehistoric mound site on private property, considered eligible for the NRHP and approximately 600 feet south of Highway 3125. Two other sites located within 1000 feet of 16SJ1 are 16SJ50 (prehistoric midden; NRHP eligibility undetermined) and 16SJ51 (prehistoric mound; NRHP eligibility undetermined), located approximately 500 feet and 250 feet south of Highway 3125, respectively. The other recorded cultural resource within ½ mile of Highway 3125 within WSLP system is 16SJ56 (historic trash dump; NRHP ineligible according to SHPO). Highway 3125 also crossed the property boundaries of Wilton (16SJ20) and Helvetia (16SJ21) Plantations, portions of which are considered eligible for the NRHP; however according to cultural resources survey in 2011 (Louisiana Site Report 22-3017) no NRHP eligible portion is located in areas of potential effect by proposed flap gates under Highway 3125.

Protective low berms will be built around residences in the small communities of Gramercy and Grand Point, and similarly were not sufficiently designated in time to receive a cultural resources survey. A total of 3 berms with approximate 15-foot basal footprint are proposed. Total length of berms proposed is approximately 6.5 miles. These berm footprints are also thought to be of low probability to affect cultural resources because of: 1) their distance (ca. 1.4, 1.5, and 2.5 miles at closest) to the Mississippi River natural levee and its more stable soils; 2) their closer proximity to seasonally wet soils; 3) the lack of an identified cultural resource by any proximate cultural resources survey; and 4) their overlap on previously developed land likely to have disturbed any previously existing cultural resource.

The SMART Feasibility Study Process implemented by USACE designates that the WSLP Study should next seek Congressional approval for construction and move to Preliminary Engineering Design (PED) of proposed features, using information and risks now extant. Discussion for a Programmatic Agreement to be formed is considered as follows:

1) Any cultural resource that may be found during the currently ongoing cultural resources survey will not have opportunity for NRHP testing if such is required by findings.
2) Borrow Material for the TSP C levee is expected to come from Bonnet Carre Spillway and has been previously coordinated for Section 106. Any change of borrow source must be coordinated for Section 106.
3) Mitigation for swamp or bottomland hardwoods that may be destroyed during construction activities, is proposed for an area near the Amite River Diversion canal. This location has not been coordinated for Section 106, and therefore must be coordinated for Section 106.

4) Although considered low potential lands to contain cultural resources, the flap gates to be placed along Highway 3125 are not sufficiently configured to determine if they may impact a cultural resource. PED should designate that no construction take place within agreed distance from sites 16SJ1, 16SJ50, and 16SJ51. Section 106 coordination should be agreed once offset from previously-existing Highway 3125 is known.
5) Although considered low potential lands to contain a cultural resource, the protective berms around Gramercy and Grand Point have not been coordinated for Section 106, and therefore must be coordinated for Section 106.
6) Currently proposed features leave approximately 80 homes outside of the WSLP system. 33 of these homes are calculated to require lifting to include them within the desired protection from a 100-year storm event. Any homes to be raised should be examined to determine if raising would adversely affect any existing NRHP status.

Maps and information that are helpful to familiarize with project area, are enclosed. A teleconference has been scheduled for March 6, 2014, at 10 a.m. central time, and the agenda and call-in information will be provided by email.

The point of contact at the CEMVN is Dr. Paul Hughbanks. You can reach him at the above address or by phone at (504) 862-1100 or by e-mail at Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be submitted to Dr. Tom McCulloch, tmcculloch@achp.gov.

Sincerely,

Sandra Sills

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

February 27, 2014

Regional Planning and
Environment Division, South
New Orleans Environmental Branch

Ms. Pam Breaux
State Historic Preservation Officer
Department of Culture, Recreation, & Tourism
P.O. Box 44247
Baton Rouge, LA 70804

Dear Ms. Breaux:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), is consulting for development of a Programmatic Agreement (PA) for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction System (WSLP) Study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate.

The proposed undertakings of the WSLP Study have the potential to effect historic properties. The WSLP Study was first authorized in 1971 and experienced many variations and delays, but now finds further development to be directed by the USACE SMART Feasibility Study Process. A draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study is available for review at http://www.mvn.usace.army.mil/Portals/56/docs/PD/Projects/WSLP/WSLPFINAL.pdf.

The CEMVN is currently funding a cultural resources survey for an approximately 18.5 mile, 550-foot wide, proposed levee corridor (TSP C) (to include construction, adjacent drainage ditch reservoirs, and Right-of-Way), that is the largest single component of the WSLP study. This levee corridor is immediately adjacent to previous cultural resource surveys (as per Louisiana SHPO files) with negative findings, for approximately 10 liner miles. Approximately 1.8 miles of levee corridor pass through or adjacent to cultural resource site 16SJB68 (Angelina Plantation) near the Mississippi River. This site received extensive cultural resources survey in 2012 (Louisiana Site Report 22-4288), and did not locate National Register of Historic Places (NRHP) eligible resources within the proposed levee corridor. Remaining areas of corridor that remain unsurveyed are within seasonally wet lands not conducive to recoverable human activity or preserved cultural resources. No other cultural resources have been recorded within 1 miles of the TSP C levee corridor. It is anticipated that any previously unrecorded cultural resource will be located by the current survey underway for the WSLP study.

Remaining undertakings of the WSLP Study are defined as "non-structural" and were not sufficiently designated in time to be included within the currently-conducted cultural resources survey, but are thought to be similarly low-probability to affect cultural resources. Existing Louisiana Highway 3125 has an elevated roadway, and will serve as a low berm to prevent storm water from affecting any resources to its south. A series of flap gates will be integrated under the roadway to allow natural water-flow as necessary and not artificially create flood damages. Site 16SJ1 is a prehistoric mound site on private property, considered eligible for the NRHP and approximately 600 feet south of Highway 3125. Two other sites located within 1000 feet of 16SJ1 are 16SJ50 (prehistoric midden; NRHP eligibility undetermined) and 16SJ51 (prehistoric mound; NRHP eligibility undetermined), located approximately 500 feet and 250 feet south of Highway 3125, respectively. The other recorded cultural resource within ½ mile of Highway 3125 within WSLP system is 16SJ56 (historic trash dump; NRHP ineligible according to SHPO). Highway 3125 also crossed the property boundaries of Wilton (16SJ20) and Helvetia (16SJ21) Plantations, portions of which are considered eligible for the NRHP; however according to cultural resources survey in 2011 (Louisiana Site Report 22-3017) no NRHP eligible portion is located in areas of potential effect by proposed flap gates under Highway 3125.

Protective low berms will be built around residences in the small communities of Gramercy and Grand Point, and similarly were not sufficiently designated in time to receive a cultural resources survey. A total of 3 berms with approximate 15-foot basal footprint are proposed. Total length of berms proposed is approximately 6.5 miles. These berm footprints are also thought to be of low probability to affect cultural resources because of: 1) their distance (ca. 1.4, 1.5, and 2.5 miles at closest) to the Mississippi River natural levee and its more stable soils; 2) their closer proximity to seasonally wet soils; 3) the lack of an identified cultural resource by any proximate cultural resources survey; and 4) their overlap on previously developed land likely to have disturbed any previously existing cultural resource.

The SMART Feasibility Study Process implemented by USACE designates that the WSLP Study should next seek Congressional approval for construction and move to Preliminary Engineering Design (PED) of proposed features, using information and risks now extant. Discussion for a Programmatic Agreement to be formed is considered as follows:

1) Any cultural resource that may be found during the currently ongoing cultural resources survey will not have opportunity for NRHP testing if such is required by findings.
2) Borrow Material for the TSP C levee is expected to come from Bonnet Carre Spillway and has been previously coordinated for Section 106. Any change of borrow source must be coordinated for Section 106.
3) Mitigation for swamp or bottomland hardwoods that may be destroyed during construction activities, is proposed for an area near the Amite River Diversion canal. This location has not been coordinated for Section 106, and therefore must be coordinated for Section 106.

4) Although considered low potential lands to contain cultural resources, the flap gates to be placed along Highway 3125 are not sufficiently configured to determine if they may impact a cultural resource. PED should designate that no construction take place within agreed distance from sites 16SJ1, 16SJ50, and 16SJ51. Section 106 coordination should be agreed once offset from previously-existing Highway 3125 is known.
5) Although considered low potential lands to contain a cultural resource, the protective berms around Gramercy and Grand Point have not been coordinated for Section 106, and therefore must be coordinated for Section 106.
6) Currently proposed features leave approximately 80 homes outside of the WSLP system. 33 of these homes are calculated to require lifting to include them within the desired protection from a 100-year storm event. Any homes to be raised should be examined to determine if raising would adversely affect any existing NRHP status.

Maps and information that are helpful to familiarize with project area, are enclosed. A teleconference has been scheduled for March 6, 2014, and the agenda and call-in information will be provided by email.

The point of contact at the CEMVN is Dr. Paul Hughbanks. You can reach him at the above address or by phone at (504) 862-1100 or by e-mail at Paul.J.Hughbanks@usace.army.mil. An electronic cop of this letter is also being sent to Section106@crt.la.gov.

Sincerely,

for Sandra Stiles
Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

February 27, 2014

Regional Planning and
Environment Division, South
New Orleans Environmental Branch

Mr. Jerome Zeringue, Executive Director
Coastal Protection and
Restoration Authority Board of Louisiana
P.O. Box 94004
Office of Governor-Coastal, 4th Floor
Baton Rouge, LA 70804

Dear Mr. Zeringue:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), is consulting for development of a Programmatic Agreement (PA) for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction System (WSLP) Study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate.

The proposed undertakings of the WSLP Study have the potential to effect historic properties. The WSLP Study was first authorized in 1971 and experienced many variations and delays, but now finds further development to be directed by the USACE SMART Feasibility Study Process. A draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study is available for review at http://www.mvn.usace.army.mil/Portals/56/docs/PD/Projects/WSLP/WSLPFINAL.pdf.

The CEMVN is currently funding a cultural resources survey for an approximately 18.5 mile, 550-foot wide, proposed levee corridor (TSP C) (to include construction, adjacent drainage ditch reservoirs, and Right-of-Way), that is the largest single component of the WSLP study. This levee corridor is immediately adjacent to previous cultural resource surveys (as per Louisiana SHPO files) with negative findings, for approximately 10 linear miles. Approximately 1.8 miles of levee corridor pass through or adjacent to cultural resource site 16SJB68 (Angelina Plantation) near the Mississippi River. This site received extensive cultural resources survey in 2012 (Louisiana Site Report 22-4288), and did not locate National Register of Historic Places (NRHP) eligible resources within the proposed levee corridor. Remaining areas of corridor that remain unsurveyed are within seasonally wet lands not conducive to recoverable human activity or preserved cultural resources. No other cultural resources have been recorded within 1 miles of the TSP C levee corridor. It is anticipated that any previously unrecorded cultural resource will be located by the current survey underway for the WSLP study.

Remaining undertakings of the WSLP Study are defined as "non-structural" and were not sufficiently designated in time to be included within the currently-conducted cultural resources survey, but are thought to be similarly low-probability to affect cultural resources. Existing Louisiana Highway 3125 has an elevated roadway, and will serve as a low berm to prevent storm water from affecting any resources to its south. A series of flap gates will be integrated under the roadway to allow natural water-flow as necessary and not artificially create flood damages. Site 16SJ1 is a prehistoric mound site on private property, considered eligible for the NRHP and approximately 600 feet south of Highway 3125. Two other sites located within 1000 feet of 16SJ1 are 16SJ50 (prehistoric midden; NRHP eligibility undetermined) and 16SJ51 (prehistoric mound; NRHP eligibility undetermined), located approximately 500 feet and 250 feet south of Highway 3125, respectively. The other recorded cultural resource within ½ mile of Highway 3125 within WSLP system is 16SJ56 (historic trash dump; NRHP ineligible according to SHPO). Highway 3125 also crossed the property boundaries of Wilton (16SJ20) and Helvetia (16SJ21) Plantations, portions of which are considered eligible for the NRHP; however according to cultural resources survey in 2011 (Louisiana Site Report 22-3017) no NRHP eligible portion is located in areas of potential effect by proposed flap gates under Highway 3125.

Protective low berms will be built around residences in the small communities of Gramercy and Grand Point, and similarly were not sufficiently designated in time to receive a cultural resources survey. A total of 3 berms with approximate 15-foot basal footprint are proposed. Total length of berms proposed is approximately 6.5 miles. These berm footprints are also thought to be of low probability to affect cultural resources because of: 1) their distance (ca. 1.4, 1.5, and 2.5 miles at closest) to the Mississippi River natural levee and its more stable soils; 2) their closer proximity to seasonally wet soils; 3) the lack of an identified cultural resource by any proximate cultural resources survey; and 4) their overlap on previously developed land likely to have disturbed any previously existing cultural resource.

The SMART Feasibility Study Process implemented by USACE designates that the WSLP Study should next seek Congressional approval for construction and move to Preliminary Engineering Design (PED) of proposed features, using information and risks now extant. Discussion for a Programmatic Agreement to be formed is considered as follows:

1) Any cultural resource that may be found during the currently ongoing cultural resources survey will not have opportunity for NRHP testing if such is required by findings.
2) Borrow Material for the TSP C levee is expected to come from Bonnet Carre Spillway and has been previously coordinated for Section 106. Any change of borrow source must be coordinated for Section 106.
3) Mitigation for swamp or bottomland hardwoods that may be destroyed during construction activities, is proposed for an area near the Amite River Diversion canal. This location has not been coordinated for Section 106, and therefore must be coordinated for Section 106.

4) Although considered low potential lands to contain cultural resources, the flap gates to be placed along Highway 3125 are not sufficiently configured to determine if they may impact a cultural resource. PED should designate that no construction take place within agreed distance from sites 16SJ1, 16SJ50, and 16SJ51. Section 106 coordination should be agreed once offset from previously-existing Highway 3125 is known.
5) Although considered low potential lands to contain a cultural resource, the protective berms around Gramercy and Grand Point have not been coordinated for Section 106, and therefore must be coordinated for Section 106.
6) Currently proposed features leave approximately 80 homes outside of the WSLP system. 33 of these homes are calculated to require lifting to include them within the desired protection from a 100-year storm event. Any homes to be raised should be examined to determine if raising would adversely affect any existing NRHP status.

Maps and information that are helpful to familiarize with project area, are enclosed. A teleconference has been scheduled for March 6, 2014, and the agenda and call-in information will be provided by email.

The point of contact at the CEMVN is Dr. Paul Hughbanks. You can reach him at the above address or by phone at (504) 862-1100 or by e-mail at Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be submitted to Ms. Elizabeth Jarrell, elizabeth.jarrell@la.gov and Ms. Elizabeth Davoli, elizabeth.davoli@la.gov.

Sincerely,

Sandra Stiles

for Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

MAY 0 3 2013

Ms. Pam Breaux
State Historic Preservation Officer
Department of Culture, Recreation and Tourism
Office of Cultural Development
P.O. Box 44247
Baton Rouge, Louisiana 70804

Re: West Shore Lake Pontchartrain Hurricane Protection Project, St. John the Baptist and St. Charles Parish, Louisiana.

Dear Ms. Breaux:

The U.S. Army Corps of Engineers, New Orleans District (The Corps) has been in process of collecting data to select an alignment for construction of a levee in St. Charles and St. John the Baptist Parish, intended to protect the citizens of these parishes from storm surges that have shown able to cause extreme flooding. No construction has yet taken place on the ground, and the Corps has developed three alignments that appear most suitable given the various interests of federal and local governments. Each of these alignments begins at the western guide levee of the Bonnet Carre Spillway, and then diverge in different paths to protect various amounts of land and urban settlement. An image showing each of these three alignments is enclosed in this letter, for your review.

The Corps has been studying the need for this protection levee for many years, and in 2001 requested that Earth Search, Inc. conduct a cultural resources survey of an alignment very similar to Alignment A (Report 22-2559; Wilson et al. 2003). No cultural resources were located as a result of this survey. Alignments C and D have not received specific cultural resources surveys, although the Corps has reviewed available records of previous surveys or previously recorded cultural resources, and found that large portions of these alignments have been partially covered by other surveys without finding cultural resources. However, the Corps does intend to continue collecting information as to the potential effects caused by the construction of any protection levee, as well as potential effects of weather events after any levee is in place. This information will continue to be compared to known cultural resource locations and surveys. The Corps will continue consultation in compliance with Section 106 of the National Historic Preservation Act.

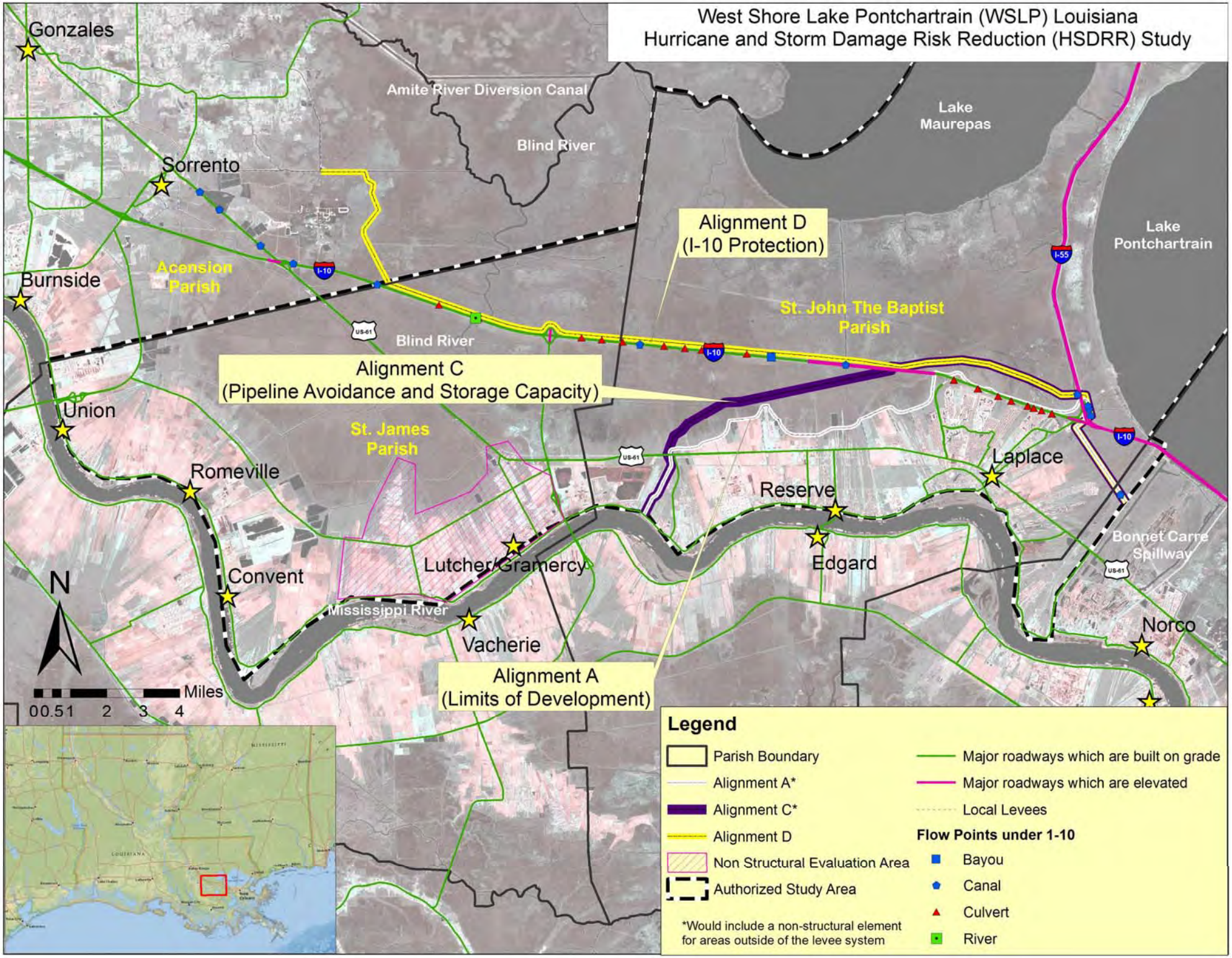
The Corps has sent this letter with intention to inform you of the current status of this project and our continuing efforts to be aware of any potential to affect historic resources. If you have concerns with this method and area of investigation, we invite you to notify us of those concerns so that we may be fully aware of them as this project proceeds. Please contact project archaeologist Dr. Paul Hughbanks, (504) 862-1100, Paul.J.Hughbanks@usace.army.mil, with any questions or comments.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures


West Shore Lake Pontchartrain (WSLP) Louisiana
Hurricane and Storm Damage Risk Reduction (HSDRR) Study
Gonzales
Amite River Diversion Canal
Blind River
Lake Maurepas
Lake Pontchartrain
Sorrento
Alignment D
(I-10 Protection)
Acension Parish
Burnside
St. John The Baptist Parish
Blind River
Alignment C
(Pipeline Avoidance and Storage Capacity)
Union
St. James Parish
Romeville
Laplace
Reserve
Bonnet Carre Spillway
Edgard
Lutcher/Gramercy
Convent
Mississippi River
Vacherie
Norco
Alignment A
(Limits of Development)
N
Miles
00.51 2 3 4
Legend
Parish Boundary
Alignment A*
Alignment C*
Alignment D
Non Structural Evaluation Area
Authorized Study Area
*Would include a non-structural element for areas outside of the levee system
Major roadways which are built on grade
Major roadways which are elevated
Local Levees
Flow Points under 1-10
Bayou
Canal
Culvert
River

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Carlos Bullock, Chairman
Alabama-Coushatta Tribe of Texas
571 State Park Rd 56
Livingston, TX 77351

Dear Chairman Bullock:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Mr. Bryant J. Celestine, Historic Preservation Officer, Alabama Coushatta Tribe of Texas, celestine.bryant@actribe.org.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Brenda Shemayme Edwards, Chairwoman
Caddo Nation of Oklahoma
P.O. Box 487
Binger, OK 73009

Dear Chairwoman Edwards:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Mr. Robert Cast, Tribal Historic Preservation Officer, Caddo Nation of Oklahoma, rcast@caddonation.org.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

John Paul Darden, Chairman
Chitimacha Tribe of Louisiana
P.O. Box 661
Charenton, LA 70523

Dear Chairman Darden:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Mrs. Kimberly Walden, M. Ed., Cultural Director/Tribal Historic Preservation Officer, Chitimacha Tribe of Louisiana, kswalden@chitimacha.gov.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Gregory E. Pyle, Chief
Choctaw Nation of Oklahoma
P.O. Box 1210
Durant, OK 74702-1210

Dear Chief Pyle:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Dr. Ian Thompson, Director/Tribal Historic Preservation Officer, Choctaw Nation of Oklahoma, ithompson@choctawnation.com.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Kevin Sickey, Chief
Coushatta Tribe of Louisiana
P.O. Box 818
Elton, LA 70532

Dear Chief Sickey:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Dr. Linda Langley, Tribal Historic Preservation Officer, Coushatta Tribe of Louisiana, llangley@mcneese.edu, and Mr. Michael Tarpley, Deputy Tribal Historic Preservation Officer, Coushatta Tribe of Louisiana, kokua.aina57@gmail.com.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

B. Cheryl Smith, Principal Chief
Jena Band of Choctaw Indians
P.O. Box 14
Jena, LA 71342

Dear Principal Chief Smith:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Ms. Dana Masters, Tribal Historic Preservation Officer, Jena Band of Choctaw Indians, jbc.thpo106@aol.com, and Ms. Lillie McCormick, Environmental Director, Jena Band of Choctaw Indians, lmmccormickjbc@centurytel.net.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Phyliss J. Anderson, Chief
Mississippi Band of Choctaw Indians
P.O. Box 6257
Choctaw, MS 39350

Dear Chief Anderson:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Mr. Kenneth H. Carleton, Tribal Historic Preservation Officer/ Archaeologist, Mississippi Band of Choctaw Indians, kcarleton@choctaw.org.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Leonard M. Harjo, Principal Chief
Seminole Nation of Oklahoma
P.O. Box 1498
Wewoka, OK 74884

Dear Principal Chief Harjo:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Ms. Natalie Harjo, Tribal Historic Preservation Officer, Seminole Nation of Oklahoma, harjo.n@sno-nsn.gov.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

James Billie, Chairman
Seminole Tribe of Florida
6300 Stirling Road
Hollywood, FL 33024

Dear Chairman Billie:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Mr. Paul N. Backhouse, Tribal Historic Preservation Officer, Seminole Tribe of Florida, paulbackhouse@semtribe.com; Ms. Anne Mullins, Deputy Tribal Historic Preservation Officer, annemullins@semtribe.com; Mr. Bradley Mueller, Compliance Review Supervisor, bradleymueller@semtribe.com; and Ms. Alison Swing, Compliance Review Data Analyst, alisonswing@semtribe.com.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Earl J. Barbry, Sr., Chairman
Tunica-Biloxi Tribe of Louisiana
P.O. Box 1589
Marksville, LA 71351

Dear Chairman Barbry:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Mr. Earl Barbry, Jr., Cultural Director, Tunica-Biloxi Tribe of Louisiana, earlii@tunica.org.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

AUGUST 23, 2013

REPLY TO ATTENTION OF

Regional Planning and
Environment Division, South

Carlos Bullock, Chairman
Alabama-Coushatta Tribe of Texas
571 State Park Rd 56
Livingston, TX 77351

Dear Chairman Bullock:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared an Integrated Draft Feasibility Report and Environmental Impact Statement (Integrated Draft Report) for the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study. The Integrated Draft Report is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain, and hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Integrated Draft Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated May 3, 2013.

The Integrated Draft Report proposes potential solutions to reduce damages from hurricane and tropical storm surge for residents in St. Charles, St. John the Baptist and St. James Parishes, Louisiana. Without action, an estimated 62,900 residents and 20,000 residential structures; 1,900 non-residential structures; and 165 public and quasi-public facilities will be at risk to damage from hurricane and tropical storm surge damages.

Eleven management measures were crafted to address storm surge. Structural and nonstructural features included levees, elevating buildings, and restoring cypress swamp. Measures were combined into a dozen alternative plans. A focused array of four alternative plans was evaluated under SMART Planning. Alternatives A and C are comprised of non-structural measures and levee alignments. A third plan (Alternative D) consists of a levee and flood wall alignment. A no-action plan is the basis to compare benefits and environmental impacts.

Alternative C is the Tentatively Selected Plan (TSP). Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final

Report. The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve, and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-6 of the Integrated Draft Report. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher, and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of E.O. 12898.

The structural component of the system would consist of earthen levees, floodwalls (T-walls), floodgates, drainage structures, and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay (borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of - 10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I- 55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however, the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year. The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms, and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located

within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis. The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally-recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN. The Choctaw Nation of Oklahoma has requested additional information regarding the undertaking, and the CEMVN will continue consultation with the SHPO and federally-recognized Tribes. With selection of the TSP as presented in the Integrated Draft Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally-recognized Tribes in a continuation of Section 106 consultation.

Integrated Draft Report

Finally, I would like to offer my apologies for an oversight resulting in an error on page 7-2 of the Integrated Draft Report. You may note that both federally-recognized Tribes and non-federally- recognized tribes are included in Table 7.1: List of report recipients, and that the Mississippi Band of Choctaw Indians was inadvertently omitted. No disrespect was intended, and actions have already been taken to ensure that this is corrected for the final report.

This is the first CEMVN study within the USACE SMART Planning framework, which organizes the planning process for feasibility studies around key decision points. Over the next few months a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into the final report, which will be made available for review before the Chief of Engineers makes a final recommendation on the project.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be 45 days from the date on which the Notice of Availability of the Draft EIS appears in the Federal Register. Please send comments or questions on the Draft Integrated Report the U.S. Army Corps of Engineers, New Orleans District, Attention: Dr. William P. Klein, Jr., P.O. Box 60267, New Orleans, Louisiana 70160-0267. Telephone: (504) 862-2540; FAX: (504) 862-2088. Comments may also be provided electronically to the study web site at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

As always, should you have any questions or concerns about the proposed action or the SMART Planning framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be provided to Mr. Bryant J. Celestine, Historic Preservation Officer, Alabama Coushatta Tribe of Texas, celestine.bryant@actribe.org.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

AUGUST 23, 2013

REPLY TO ATTENTION OF

Regional Planning and
Environment Division, South

Brenda Shemayme Edwards, Chairwoman
Caddo Nation of Oklahoma
P.O. Box 487
Binger, OK 73009

Dear Chairwoman Edwards:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared an Integrated Draft Feasibility Report and Environmental Impact Statement (Integrated Draft Report) for the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study. The Integrated Draft Report is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain, and hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Integrated Draft Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated May 3, 2013.

The Integrated Draft Report proposes potential solutions to reduce damages from hurricane and tropical storm surge for residents in St. Charles, St. John the Baptist and St. James Parishes, Louisiana. Without action, an estimated 62,900 residents and 20,000 residential structures; 1,900 non-residential structures; and 165 public and quasi-public facilities will be at risk to damage from hurricane and tropical storm surge damages.

Eleven management measures were crafted to address storm surge. Structural and nonstructural features included levees, elevating buildings, and restoring cypress swamp. Measures were combined into a dozen alternative plans. A focused array of four alternative plans was evaluated under SMART Planning. Alternatives A and C are comprised of non-structural measures and levee alignments. A third plan (Alternative D) consists of a levee and flood wall alignment. A no-action plan is the basis to compare benefits and environmental impacts.

Alternative C is the Tentatively Selected Plan (TSP). Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final

Report. The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve, and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-6 of the Integrated Draft Report. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher, and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of E.O. 12898.

The structural component of the system would consist of earthen levees, floodwalls (T-walls), floodgates, drainage structures, and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay (borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of - 10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I- 55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however, the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year. The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms, and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located

within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis. The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally-recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN. The Choctaw Nation of Oklahoma has requested additional information regarding the undertaking, and the CEMVN will continue consultation with the SHPO and federally-recognized Tribes. With selection of the TSP as presented in the Integrated Draft Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally-recognized Tribes in a continuation of Section 106 consultation.

Integrated Draft Report

Finally, I would like to offer my apologies for an oversight resulting in an error on page 7-2 of the Integrated Draft Report. You may note that both federally-recognized Tribes and non-federally- recognized tribes are included in Table 7.1: List of report recipients, and that the Mississippi Band of Choctaw Indians was inadvertently omitted. No disrespect was intended, and actions have already been taken to ensure that this is corrected for the final report.

This is the first CEMVN study within the USACE SMART Planning framework, which organizes the planning process for feasibility studies around key decision points. Over the next few months a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into the final report, which will be made available for review before the Chief of Engineers makes a final recommendation on the project.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be 45 days from the date on which the Notice of Availability of the Draft EIS appears in the Federal Register. Please send comments or questions on the Draft Integrated Report the U.S. Army Corps of Engineers, New Orleans District, Attention: Dr. William P. Klein, Jr., P.O. Box 60267, New Orleans, Louisiana 70160-0267. Telephone: (504) 862-2540; FAX: (504) 862-2088. Comments may also be provided electronically to the study web site at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

As always, should you have any questions or concerns about the proposed action or the SMART Planning framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be provided to Mr. Robert Cast, Tribal Historic Preservation Officer, Caddo Nation of Oklahoma, rcast@caddonation.org.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

AUGUST 23, 2013

REPLY TO ATTENTION OF

Regional Planning and
Environment Division, South

John Paul Darden, Chairman
Chitimacha Tribe of Louisiana
P.O. Box 661
Charenton, LA 70523

Dear Chairman Darden:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared an Integrated Draft Feasibility Report and Environmental Impact Statement (Integrated Draft Report) for the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study. The Integrated Draft Report is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain, and hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Integrated Draft Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated May 3, 2013.

The Integrated Draft Report proposes potential solutions to reduce damages from hurricane and tropical storm surge for residents in St. Charles, St. John the Baptist and St. James Parishes, Louisiana. Without action, an estimated 62,900 residents and 20,000 residential structures; 1,900 non-residential structures; and 165 public and quasi-public facilities will be at risk to damage from hurricane and tropical storm surge damages.

Eleven management measures were crafted to address storm surge. Structural and nonstructural features included levees, elevating buildings, and restoring cypress swamp. Measures were combined into a dozen alternative plans. A focused array of four alternative plans was evaluated under SMART Planning. Alternatives A and C are comprised of non-structural measures and levee alignments. A third plan (Alternative D) consists of a levee and flood wall alignment. A no-action plan is the basis to compare benefits and environmental impacts.

Alternative C is the Tentatively Selected Plan (TSP). Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final

Report. The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve, and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-6 of the Integrated Draft Report. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher, and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of E.O. 12898.

The structural component of the system would consist of earthen levees, floodwalls (T-walls), floodgates, drainage structures, and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay (borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of - 10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I- 55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however, the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year. The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms, and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located

within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis. The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally-recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN. The Choctaw Nation of Oklahoma has requested additional information regarding the undertaking, and the CEMVN will continue consultation with the SHPO and federally-recognized Tribes. With selection of the TSP as presented in the Integrated Draft Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally-recognized Tribes in a continuation of Section 106 consultation.

Integrated Draft Report

Finally, I would like to offer my apologies for an oversight resulting in an error on page 7-2 of the Integrated Draft Report. You may note that both federally-recognized Tribes and non-federally- recognized tribes are included in Table 7.1: List of report recipients, and that the Mississippi Band of Choctaw Indians was inadvertently omitted. No disrespect was intended, and actions have already been taken to ensure that this is corrected for the final report.

This is the first CEMVN study within the USACE SMART Planning framework, which organizes the planning process for feasibility studies around key decision points. Over the next few months a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into the final report, which will be made available for review before the Chief of Engineers makes a final recommendation on the project.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be 45 days from the date on which the Notice of Availability of the Draft EIS appears in the Federal Register. Please send comments or questions on the Draft Integrated Report the U.S. Army Corps of Engineers, New Orleans District, Attention: Dr. William P. Klein, Jr., P.O. Box 60267, New Orleans, Louisiana 70160-0267. Telephone: (504) 862-2540; FAX: (504) 862-2088. Comments may also be provided electronically to the study web site at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

As always, should you have any questions or concerns about the proposed action or the SMART Planning framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be provided to Mrs. Kimberly Walden, M. Ed., Cultural Director/Tribal Historic Preservation Officer, Chitimacha Tribe of Louisiana, kswalden@chitimacha.gov.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

AUGUST 23, 2013

REPLY TO ATTENTION OF

Regional Planning and
Environment Division, South

Gregory E. Pyle, Chief
Choctaw Nation of Oklahoma
P.O. Box 1210
Durant, OK 74702-1210

Dear Chief Pyle:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared an Integrated Draft Feasibility Report and Environmental Impact Statement (Integrated Draft Report) for the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study. The Integrated Draft Report is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain, and hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Integrated Draft Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated May 3, 2013.

The Integrated Draft Report proposes potential solutions to reduce damages from hurricane and tropical storm surge for residents in St. Charles, St. John the Baptist and St. James Parishes, Louisiana. Without action, an estimated 62,900 residents and 20,000 residential structures; 1,900 non-residential structures; and 165 public and quasi-public facilities will be at risk to damage from hurricane and tropical storm surge damages.

Eleven management measures were crafted to address storm surge. Structural and nonstructural features included levees, elevating buildings, and restoring cypress swamp. Measures were combined into a dozen alternative plans. A focused array of four alternative plans was evaluated under SMART Planning. Alternatives A and C are comprised of non-structural measures and levee alignments. A third plan (Alternative D) consists of a levee and flood wall alignment. A no-action plan is the basis to compare benefits and environmental impacts.

Alternative C is the Tentatively Selected Plan (TSP). Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final

Report. The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve, and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-6 of the Integrated Draft Report. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher, and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of E.O. 12898.

The structural component of the system would consist of earthen levees, floodwalls (T-walls), floodgates, drainage structures, and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay (borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of - 10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I- 55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however, the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year. The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms, and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located

within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis. The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally-recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN. The Choctaw Nation of Oklahoma has requested additional information regarding the undertaking, and the CEMVN will continue consultation with the SHPO and federally-recognized Tribes. With selection of the TSP as presented in the Integrated Draft Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally-recognized Tribes in a continuation of Section 106 consultation.

Integrated Draft Report

Finally, I would like to offer my apologies for an oversight resulting in an error on page 7-2 of the Integrated Draft Report. You may note that both federally-recognized Tribes and non-federally- recognized tribes are included in Table 7.1: List of report recipients, and that the Mississippi Band of Choctaw Indians was inadvertently omitted. No disrespect was intended, and actions have already been taken to ensure that this is corrected for the final report.

This is the first CEMVN study within the USACE SMART Planning framework, which organizes the planning process for feasibility studies around key decision points. Over the next few months a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into the final report, which will be made available for review before the Chief of Engineers makes a final recommendation on the project.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be 45 days from the date on which the Notice of Availability of the Draft EIS appears in the Federal Register. Please send comments or questions on the Draft Integrated Report the U.S. Army Corps of Engineers, New Orleans District, Attention: Dr. William P. Klein, Jr., P.O. Box 60267, New Orleans, Louisiana 70160-0267. Telephone: (504) 862-2540; FAX: (504) 862-2088. Comments may also be provided electronically to the study web site at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

As always, should you have any questions or concerns about the proposed action or the SMART Planning framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be provided to Dr. Ian Thompson, Director/Tribal Historic Preservation Officer, Choctaw Nation of Oklahoma, ithompson@choctawnation.com and Ms. Johnnie Jacobs, NHPA Section 106 Coordinator, jjacobs@choctawnation.com.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

AUGUST 23, 2013

REPLY TO ATTENTION OF

Regional Planning and
Environment Division, South

Kevin Sickey, Chief
Coushatta Tribe of Louisiana
P.O. Box 818
Elton, LA 70532

Dear Chief Sickey:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared an Integrated Draft Feasibility Report and Environmental Impact Statement (Integrated Draft Report) for the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study. The Integrated Draft Report is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain, and hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Integrated Draft Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated May 3, 2013.

The Integrated Draft Report proposes potential solutions to reduce damages from hurricane and tropical storm surge for residents in St. Charles, St. John the Baptist and St. James Parishes, Louisiana. Without action, an estimated 62,900 residents and 20,000 residential structures; 1,900 non-residential structures; and 165 public and quasi-public facilities will be at risk to damage from hurricane and tropical storm surge damages.

Eleven management measures were crafted to address storm surge. Structural and nonstructural features included levees, elevating buildings, and restoring cypress swamp. Measures were combined into a dozen alternative plans. A focused array of four alternative plans was evaluated under SMART Planning. Alternatives A and C are comprised of non-structural measures and levee alignments. A third plan (Alternative D) consists of a levee and flood wall alignment. A no-action plan is the basis to compare benefits and environmental impacts.

Alternative C is the Tentatively Selected Plan (TSP). Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final

Report. The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve, and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-6 of the Integrated Draft Report. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher, and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of E.O. 12898.

The structural component of the system would consist of earthen levees, floodwalls (T-walls), floodgates, drainage structures, and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay (borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of - 10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I- 55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however, the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year. The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms, and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located

within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis. The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally-recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN. The Choctaw Nation of Oklahoma has requested additional information regarding the undertaking, and the CEMVN will continue consultation with the SHPO and federally-recognized Tribes. With selection of the TSP as presented in the Integrated Draft Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally-recognized Tribes in a continuation of Section 106 consultation.

Integrated Draft Report

Finally, I would like to offer my apologies for an oversight resulting in an error on page 7-2 of the Integrated Draft Report. You may note that both federally-recognized Tribes and non-federally- recognized tribes are included in Table 7.1: List of report recipients, and that the Mississippi Band of Choctaw Indians was inadvertently omitted. No disrespect was intended, and actions have already been taken to ensure that this is corrected for the final report.

This is the first CEMVN study within the USACE SMART Planning framework, which organizes the planning process for feasibility studies around key decision points. Over the next few months a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into the final report, which will be made available for review before the Chief of Engineers makes a final recommendation on the project.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be 45 days from the date on which the Notice of Availability of the Draft EIS appears in the Federal Register. Please send comments or questions on the Draft Integrated Report the U.S. Army Corps of Engineers, New Orleans District, Attention: Dr. William P. Klein, Jr., P.O. Box 60267, New Orleans, Louisiana 70160-0267. Telephone: (504) 862-2540; FAX: (504) 862-2088. Comments may also be provided electronically to the study web site at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

As always, should you have any questions or concerns about the proposed action or the SMART Planning framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be provided to Dr. Linda Langley, Tribal Historic Preservation Officer, Coushatta Tribe of Louisiana, llangley@mcneese.edu, and Mr. Michael Tarpley, Deputy Tribal Historic Preservation Officer, Coushatta Tribe of Louisiana, kokua.aina57@gmail.com.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

AUGUST 23, 2013

REPLY TO ATTENTION OF

Regional Planning and
Environment Division, South

B. Cheryl Smith, Principal Chief
Jena Band of Choctaw Indians
P.O. Box 14
Jena, LA 71342

Dear Principal Chief Smith:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared an Integrated Draft Feasibility Report and Environmental Impact Statement (Integrated Draft Report) for the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study. The Integrated Draft Report is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain, and hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Integrated Draft Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated May 3, 2013.

The Integrated Draft Report proposes potential solutions to reduce damages from hurricane and tropical storm surge for residents in St. Charles, St. John the Baptist and St. James Parishes, Louisiana. Without action, an estimated 62,900 residents and 20,000 residential structures; 1,900 non-residential structures; and 165 public and quasi-public facilities will be at risk to damage from hurricane and tropical storm surge damages.

Eleven management measures were crafted to address storm surge. Structural and nonstructural features included levees, elevating buildings, and restoring cypress swamp. Measures were combined into a dozen alternative plans. A focused array of four alternative plans was evaluated under SMART Planning. Alternatives A and C are comprised of non-structural measures and levee alignments. A third plan (Alternative D) consists of a levee and flood wall alignment. A no-action plan is the basis to compare benefits and environmental impacts.

Alternative C is the Tentatively Selected Plan (TSP). Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final

Report. The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve, and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-6 of the Integrated Draft Report. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher, and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of E.O. 12898.

The structural component of the system would consist of earthen levees, floodwalls (T-walls), floodgates, drainage structures, and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay (borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of - 10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I- 55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however, the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year. The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms, and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located

within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis. The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally-recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN. The Choctaw Nation of Oklahoma has requested additional information regarding the undertaking, and the CEMVN will continue consultation with the SHPO and federally-recognized Tribes. With selection of the TSP as presented in the Integrated Draft Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally-recognized Tribes in a continuation of Section 106 consultation.

Integrated Draft Report

Finally, I would like to offer my apologies for an oversight resulting in an error on page 7-2 of the Integrated Draft Report. You may note that both federally-recognized Tribes and non-federally- recognized tribes are included in Table 7.1: List of report recipients, and that the Mississippi Band of Choctaw Indians was inadvertently omitted. No disrespect was intended, and actions have already been taken to ensure that this is corrected for the final report.

This is the first CEMVN study within the USACE SMART Planning framework, which organizes the planning process for feasibility studies around key decision points. Over the next few months a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into the final report, which will be made available for review before the Chief of Engineers makes a final recommendation on the project.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be 45 days from the date on which the Notice of Availability of the Draft EIS appears in the Federal Register. Please send comments or questions on the Draft Integrated Report the U.S. Army Corps of Engineers, New Orleans District, Attention: Dr. William P. Klein, Jr., P.O. Box 60267, New Orleans, Louisiana 70160-0267. Telephone: (504) 862-2540; FAX: (504) 862-2088. Comments may also be provided electronically to the study web site at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

As always, should you have any questions or concerns about the proposed action or the SMART Planning framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be provided to Ms. Dana Masters, Tribal Historic Preservation Officer, Jena Band of Choctaw Indians, jbc.thpo106@aol.com, and Ms. Lillie McCormick, Environmental Director, Jena Band of Choctaw Indians, lmmccormickjbc@centurytel.net.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

AUGUST 23, 2013

REPLY TO ATTENTION OF

Regional Planning and
Environment Division, South

Phyliss J. Anderson, Chief
Mississippi Band of Choctaw Indians
P.O. Box 6257
Choctaw, MS 39350

Dear Chief Anderson:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared an Integrated Draft Feasibility Report and Environmental Impact Statement (Integrated Draft Report) for the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study. The Integrated Draft Report is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain, and hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Integrated Draft Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated May 3, 2013.

The Integrated Draft Report proposes potential solutions to reduce damages from hurricane and tropical storm surge for residents in St. Charles, St. John the Baptist and St. James Parishes, Louisiana. Without action, an estimated 62,900 residents and 20,000 residential structures; 1,900 non-residential structures; and 165 public and quasi-public facilities will be at risk to damage from hurricane and tropical storm surge damages.

Eleven management measures were crafted to address storm surge. Structural and nonstructural features included levees, elevating buildings, and restoring cypress swamp. Measures were combined into a dozen alternative plans. A focused array of four alternative plans was evaluated under SMART Planning. Alternatives A and C are comprised of non-structural measures and levee alignments. A third plan (Alternative D) consists of a levee and flood wall alignment. A no-action plan is the basis to compare benefits and environmental impacts.

Alternative C is the Tentatively Selected Plan (TSP). Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final

Report. The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve, and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-6 of the Integrated Draft Report. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher, and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of E.O. 12898.

The structural component of the system would consist of earthen levees, floodwalls (T-walls), floodgates, drainage structures, and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay (borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of - 10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I- 55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however, the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year. The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms, and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located

within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis. The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally-recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN. The Choctaw Nation of Oklahoma has requested additional information regarding the undertaking, and the CEMVN will continue consultation with the SHPO and federally-recognized Tribes. With selection of the TSP as presented in the Integrated Draft Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally-recognized Tribes in a continuation of Section 106 consultation.

Integrated Draft Report

Finally, I would like to offer my apologies for an oversight resulting in an error on page 7-2 of the Integrated Draft Report. You may note that both federally-recognized Tribes and non-federally- recognized tribes are included in Table 7.1: List of report recipients, and that the Mississippi Band of Choctaw Indians was inadvertently omitted. No disrespect was intended, and actions have already been taken to ensure that this is corrected for the final report.

This is the first CEMVN study within the USACE SMART Planning framework, which organizes the planning process for feasibility studies around key decision points. Over the next few months a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into the final report, which will be made available for review before the Chief of Engineers makes a final recommendation on the project.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be 45 days from the date on which the Notice of Availability of the Draft EIS appears in the Federal Register. Please send comments or questions on the Draft Integrated Report the U.S. Army Corps of Engineers, New Orleans District, Attention: Dr. William P. Klein, Jr., P.O. Box 60267, New Orleans, Louisiana 70160-0267. Telephone: (504) 862-2540; FAX: (504) 862-2088. Comments may also be provided electronically to the study web site at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

As always, should you have any questions or concerns about the proposed action or the SMART Planning framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be provided to Mr. Kenneth H. Carleton, Tribal Historic Preservation Officer/ Archaeologist, Mississippi Band of Choctaw Indians, kcarleton@choctaw.org.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

AUGUST 23, 2013

REPLY TO ATTENTION OF

Regional Planning and
Environment Division, South

John Berrey, Chairman
Quapaw Tribe of Oklahoma
P.O. Box 765
Quapaw, OK 74363

Dear Chairman Berrey:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared an Integrated Draft Feasibility Report and Environmental Impact Statement (Integrated Draft Report) for the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study. The Integrated Draft Report is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain, and hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Integrated Draft Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated May 3, 2013.

The Integrated Draft Report proposes potential solutions to reduce damages from hurricane and tropical storm surge for residents in St. Charles, St. John the Baptist and St. James Parishes, Louisiana. Without action, an estimated 62,900 residents and 20,000 residential structures; 1,900 non-residential structures; and 165 public and quasi-public facilities will be at risk to damage from hurricane and tropical storm surge damages.

Eleven management measures were crafted to address storm surge. Structural and nonstructural features included levees, elevating buildings, and restoring cypress swamp. Measures were combined into a dozen alternative plans. A focused array of four alternative plans was evaluated under SMART Planning. Alternatives A and C are comprised of non-structural measures and levee alignments. A third plan (Alternative D) consists of a levee and flood wall alignment. A no-action plan is the basis to compare benefits and environmental impacts.

Alternative C is the Tentatively Selected Plan (TSP). Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final

Report. The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve, and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-6 of the Integrated Draft Report. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher, and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of E.O. 12898.

The structural component of the system would consist of earthen levees, floodwalls (T-walls), floodgates, drainage structures, and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay (borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of - 10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I- 55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however, the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year. The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms, and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located

within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis. The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally-recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN. The Choctaw Nation of Oklahoma has requested additional information regarding the undertaking, and the CEMVN will continue consultation with the SHPO and federally-recognized Tribes. With selection of the TSP as presented in the Integrated Draft Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally-recognized Tribes in a continuation of Section 106 consultation.

Integrated Draft Report

Finally, I would like to offer my apologies for an oversight resulting in an error on page 7-2 of the Integrated Draft Report. You may note that both federally-recognized Tribes and non-federally- recognized tribes are included in Table 7.1: List of report recipients, and that the Mississippi Band of Choctaw Indians was inadvertently omitted. No disrespect was intended, and actions have already been taken to ensure that this is corrected for the final report.

This is the first CEMVN study within the USACE SMART Planning framework, which organizes the planning process for feasibility studies around key decision points. Over the next few months a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into the final report, which will be made available for review before the Chief of Engineers makes a final recommendation on the project.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be 45 days from the date on which the Notice of Availability of the Draft EIS appears in the Federal Register. Please send comments or questions on the Draft Integrated Report the U.S. Army Corps of Engineers, New Orleans District, Attention: Dr. William P. Klein, Jr., P.O. Box 60267, New Orleans, Louisiana 70160-0267. Telephone: (504) 862-2540; FAX: (504) 862-2088. Comments may also be provided electronically to the study web site at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

As always, should you have any questions or concerns about the proposed action or the SMART Planning framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be provided to Ms. Jean Ann Lambert, Tribal Historic Preservation Officer, Quapaw Tribe of Oklahoma, jlambert@quapawtribe.com.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

AUGUST 23, 2013

REPLY TO ATTENTION OF

Regional Planning and
Environment Division, South

Leonard M. Harjo, Principal Chief
Seminole Nation of Oklahoma
P.O. Box 1498
Wewoka, OK 74884

Dear Principal Chief Harjo:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared an Integrated Draft Feasibility Report and Environmental Impact Statement (Integrated Draft Report) for the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study. The Integrated Draft Report is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain, and hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Integrated Draft Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated May 3, 2013.

The Integrated Draft Report proposes potential solutions to reduce damages from hurricane and tropical storm surge for residents in St. Charles, St. John the Baptist and St. James Parishes, Louisiana. Without action, an estimated 62,900 residents and 20,000 residential structures; 1,900 non-residential structures; and 165 public and quasi-public facilities will be at risk to damage from hurricane and tropical storm surge damages.

Eleven management measures were crafted to address storm surge. Structural and nonstructural features included levees, elevating buildings, and restoring cypress swamp. Measures were combined into a dozen alternative plans. A focused array of four alternative plans was evaluated under SMART Planning. Alternatives A and C are comprised of non-structural measures and levee alignments. A third plan (Alternative D) consists of a levee and flood wall alignment. A no-action plan is the basis to compare benefits and environmental impacts.

Alternative C is the Tentatively Selected Plan (TSP). Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final

Report. The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve, and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-6 of the Integrated Draft Report. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher, and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of E.O. 12898.

The structural component of the system would consist of earthen levees, floodwalls (T-walls), floodgates, drainage structures, and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay (borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of - 10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I- 55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however, the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year. The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms, and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located

within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis. The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally-recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN. The Choctaw Nation of Oklahoma has requested additional information regarding the undertaking, and the CEMVN will continue consultation with the SHPO and federally-recognized Tribes. With selection of the TSP as presented in the Integrated Draft Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally-recognized Tribes in a continuation of Section 106 consultation.

Integrated Draft Report

Finally, I would like to offer my apologies for an oversight resulting in an error on page 7-2 of the Integrated Draft Report. You may note that both federally-recognized Tribes and non-federally- recognized tribes are included in Table 7.1: List of report recipients, and that the Mississippi Band of Choctaw Indians was inadvertently omitted. No disrespect was intended, and actions have already been taken to ensure that this is corrected for the final report.

This is the first CEMVN study within the USACE SMART Planning framework, which organizes the planning process for feasibility studies around key decision points. Over the next few months a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into the final report, which will be made available for review before the Chief of Engineers makes a final recommendation on the project.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be 45 days from the date on which the Notice of Availability of the Draft EIS appears in the Federal Register. Please send comments or questions on the Draft Integrated Report the U.S. Army Corps of Engineers, New Orleans District, Attention: Dr. William P. Klein, Jr., P.O. Box 60267, New Orleans, Louisiana 70160-0267. Telephone: (504) 862-2540; FAX: (504) 862-2088. Comments may also be provided electronically to the study web site at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

As always, should you have any questions or concerns about the proposed action or the SMART Planning framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be provided to Ms. Natalie Harjo, Tribal Historic Preservation Officer, Seminole Nation of Oklahoma, harjo.n@sno-nsn.gov.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

AUGUST 23, 2013

REPLY TO ATTENTION OF

Regional Planning and
Environment Division, South

James Billie, Chairman
Seminole Tribe of Florida
6300 Stirling Road
Hollywood, FL 33024

Dear Chairman Billie:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared an Integrated Draft Feasibility Report and Environmental Impact Statement (Integrated Draft Report) for the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study. The Integrated Draft Report is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain, and hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Integrated Draft Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated May 3, 2013.

The Integrated Draft Report proposes potential solutions to reduce damages from hurricane and tropical storm surge for residents in St. Charles, St. John the Baptist and St. James Parishes, Louisiana. Without action, an estimated 62,900 residents and 20,000 residential structures; 1,900 non-residential structures; and 165 public and quasi-public facilities will be at risk to damage from hurricane and tropical storm surge damages.

Eleven management measures were crafted to address storm surge. Structural and nonstructural features included levees, elevating buildings, and restoring cypress swamp. Measures were combined into a dozen alternative plans. A focused array of four alternative plans was evaluated under SMART Planning. Alternatives A and C are comprised of non-structural measures and levee alignments. A third plan (Alternative D) consists of a levee and flood wall alignment. A no-action plan is the basis to compare benefits and environmental impacts.

Alternative C is the Tentatively Selected Plan (TSP). Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final

Report. The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve, and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-6 of the Integrated Draft Report. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher, and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of E.O. 12898.

The structural component of the system would consist of earthen levees, floodwalls (T-walls), floodgates, drainage structures, and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay (borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of - 10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I- 55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however, the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year. The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms, and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located

within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis. The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally-recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN. The Choctaw Nation of Oklahoma has requested additional information regarding the undertaking, and the CEMVN will continue consultation with the SHPO and federally-recognized Tribes. With selection of the TSP as presented in the Integrated Draft Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally-recognized Tribes in a continuation of Section 106 consultation.

Integrated Draft Report

Finally, I would like to offer my apologies for an oversight resulting in an error on page 7-2 of the Integrated Draft Report. You may note that both federally-recognized Tribes and non-federally- recognized tribes are included in Table 7.1: List of report recipients, and that the Mississippi Band of Choctaw Indians was inadvertently omitted. No disrespect was intended, and actions have already been taken to ensure that this is corrected for the final report.

This is the first CEMVN study within the USACE SMART Planning framework, which organizes the planning process for feasibility studies around key decision points. Over the next few months a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into the final report, which will be made available for review before the Chief of Engineers makes a final recommendation on the project.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be 45 days from the date on which the Notice of Availability of the Draft EIS appears in the Federal Register. Please send comments or questions on the Draft Integrated Report the U.S. Army Corps of Engineers, New Orleans District, Attention: Dr. William P. Klein, Jr., P.O. Box 60267, New Orleans, Louisiana 70160-0267. Telephone: (504) 862-2540; FAX: (504) 862-2088. Comments may also be provided electronically to the study web site at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

As always, should you have any questions or concerns about the proposed action or the SMART Planning framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be provided to Mr. Paul N. Backhouse, Tribal Historic Preservation Officer, Seminole Tribe of Florida, paulbackhouse@semtribe.com; Ms. Anne Mullins, Deputy Tribal Historic Preservation Officer, annemullins@semtribe.com; Mr. Bradley Mueller, Compliance Review Supervisor, bradleymueller@semtribe.com; and Ms. Alison Swing, Compliance Review Data Analyst, alisonswing@semtribe.com.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

AUGUST 23, 2013

REPLY TO ATTENTION OF

Regional Planning and
Environment Division, South

Earl J. Barbry, Sr., Chairman
Tunica-Biloxi Tribe of Louisiana
P.O. Box 1589
Marksville, LA 71351

Dear Chairman Barbry:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared an Integrated Draft Feasibility Report and Environmental Impact Statement (Integrated Draft Report) for the West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study. The Integrated Draft Report is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain, and hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Integrated Draft Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated May 3, 2013.

The Integrated Draft Report proposes potential solutions to reduce damages from hurricane and tropical storm surge for residents in St. Charles, St. John the Baptist and St. James Parishes, Louisiana. Without action, an estimated 62,900 residents and 20,000 residential structures; 1,900 non-residential structures; and 165 public and quasi-public facilities will be at risk to damage from hurricane and tropical storm surge damages.

Eleven management measures were crafted to address storm surge. Structural and nonstructural features included levees, elevating buildings, and restoring cypress swamp. Measures were combined into a dozen alternative plans. A focused array of four alternative plans was evaluated under SMART Planning. Alternatives A and C are comprised of non-structural measures and levee alignments. A third plan (Alternative D) consists of a levee and flood wall alignment. A no-action plan is the basis to compare benefits and environmental impacts.

Alternative C is the Tentatively Selected Plan (TSP). Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final

Report. The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve, and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-6 of the Integrated Draft Report. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher, and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of E.O. 12898.

The structural component of the system would consist of earthen levees, floodwalls (T-walls), floodgates, drainage structures, and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay (borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of - 10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I- 55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however, the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year. The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms, and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located

within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis. The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally-recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN. The Choctaw Nation of Oklahoma has requested additional information regarding the undertaking, and the CEMVN will continue consultation with the SHPO and federally-recognized Tribes. With selection of the TSP as presented in the Integrated Draft Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally-recognized Tribes in a continuation of Section 106 consultation.

Integrated Draft Report

Finally, I would like to offer my apologies for an oversight resulting in an error on page 7-2 of the Integrated Draft Report. You may note that both federally-recognized Tribes and non-federally- recognized tribes are included in Table 7.1: List of report recipients, and that the Mississippi Band of Choctaw Indians was inadvertently omitted. No disrespect was intended, and actions have already been taken to ensure that this is corrected for the final report.

This is the first CEMVN study within the USACE SMART Planning framework, which organizes the planning process for feasibility studies around key decision points. Over the next few months a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into the final report, which will be made available for review before the Chief of Engineers makes a final recommendation on the project.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be 45 days from the date on which the Notice of Availability of the Draft EIS appears in the Federal Register. Please send comments or questions on the Draft Integrated Report the U.S. Army Corps of Engineers, New Orleans District, Attention: Dr. William P. Klein, Jr., P.O. Box 60267, New Orleans, Louisiana 70160-0267. Telephone: (504) 862-2540; FAX: (504) 862-2088. Comments may also be provided electronically to the study web site at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

As always, should you have any questions or concerns about the proposed action or the SMART Planning framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter will be provided to Mr. Earl Barbry, Jr., Cultural Director, Tunica-Biloxi Tribe of Louisiana, earlii@tunica.org.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

May 3, 2013

Regional Planning and
Environment Division, South

Carlos Bullock, Chairman
Alabama-Coushatta Tribe of Texas
571 State Park Rd 56
Livingston, TX 77351

Dear Chairman Bullock:

The United States Army Corps of Engineers (USACE) and the Pontchartrain Levee District (PLD) have initiated an investigation into the feasibility of providing hurricane and storm damage risk reduction to residents living in the area west of the Bonnet Carré Spillway between the Mississippi River and Lakes Pontchartrain and Maurepas and the St. James Parish line. The New Orleans District (CEMVN) is preparing a West Shore-Lake Pontchartrain (WSLP) Integrated Feasibility Study/Environmental Impact Statement (Integrated Report), which will describe all aspects of the WSLP Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) study, from its inception, through the evolution of the various alternatives, the discussion of potential impacts to all applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the WSLP LA HSDRR study, in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands.

Study Authority and History of Investigation

The WSLP LA HSDRR study was initiated by two authorizations, one by the House of Representatives in 1971 and another by the Senate in 1974. Several formulations and reports have been accomplished since the original authorizations. In 1996 Congress authorized funding for a general investigation into hurricane and flood protection in St. James, St. John the Baptist, and St. Charles parishes in the area west of the Bonne Carré Spillway as part of the Lake Pontchartrain and Vicinity, Louisiana Authority. Subsequently, a feasibility study was initiated and the preliminary findings were presented to the PLD and St. John Parish in 1998. One of the eight alignments from the preliminary findings and an additional alignment presented by the PLD were chosen for further investigation and in 2003, the USACE presented alignment and

cost options to the PLD and St. John the Baptist Parish for these two alternatives. No consensus could be reached on which alignment to pursue and the study was halted. In 2006, the PLD developed a third alignment for consideration by the USACE and St. John the Baptist Parish. A preliminary screening level analysis was completed in 2007, and the PLD and the USACE agreed to re-initiate the feasibility study and an EIS.

Study Area

The WSLP LA HSDRR study area is located in St. Charles, St. John the Baptist and St. James parishes, Louisiana (see enclosed Figure 1). The study area is bounded on the east by the west guide levee of the Bonnet Carré Spillway, on the north by Lake Pontchartrain and Lake Maurepas, on the west by the St. James Parish line and on the south by the Mississippi River. The study area includes residential, commercial, industrial and undeveloped land. The southern portion of the study contains the communities of LaPlace, Reserve, Garyville, Gramercy, Lutcher and Convent. Most of the northern portion is occupied by the Maurepas Swamp Wildlife Management Area and includes sections of Interstate Highway 10 (I-10) and I-55.

Proposed Alignments

Thirty-two alignments were identified and screened based on objectives and constraints and local conditions, including pipeline avoidance and storage and infrastructure concerns, reducing the number of alignments to twelve. These twelve alignments were ranked based on their ability to meet the study objectives and avoid constraints, and the top four alignments that met evaluation criteria were carried forward for evaluation. An additional non-structural alternative was developed.

The final array of alternatives include the No Action Alternative; Alternative A: Spillway to Hope Canal/Mississippi River and Non-Structural Alternative; Alternative C: Spillway to Hope Canal/MS River (Pipeline Avoidance) and Non-Structural Alternative; Alternative D: Spillway to Ascension Parish (I-10 Protection) without Non-Structural Alternative; and Alternative E: Non-Structural Alternative (see enclosed Figure 2).

Section 106 Consultation

This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). The majority of the authorized study area is within the Maurepas Swamp, although the study area also contains natural levee of the Mississippi River. Upon selection of the tentatively selected plan and the identification of historic properties, in accordance with 36 CFR § 800.4, the CEMVN will continue Section 106 consultation. Also enclosed is a copy of the 3 May 2013 CEMVN letter to the Louisiana State Historic Preservation Officer.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Mr. Bryant J. Celestine, Historic Preservation Officer, Alabama Coushatta Tribe of Texas, celestine.bryant@actribe.org.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

May 3, 2013

Regional Planning and
Environment Division, South

Brenda Shemayme Edwards, Chairwoman
Caddo Nation of Oklahoma
P.O. Box 487
Binger, OK 73009

Dear Chairwoman Edwards:

The United States Army Corps of Engineers (USACE) and the Pontchartrain Levee District (PLD) have initiated an investigation into the feasibility of providing hurricane and storm damage risk reduction to residents living in the area west of the Bonnet Carré Spillway between the Mississippi River and Lakes Pontchartrain and Maurepas and the St. James Parish line. The New Orleans District (CEMVN) is preparing a West Shore-Lake Pontchartrain (WSLP) Integrated Feasibility Study/Environmental Impact Statement (Integrated Report), which will describe all aspects of the WSLP Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) study, from its inception, through the evolution of the various alternatives, the discussion of potential impacts to all applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the WSLP LA HSDRR study, in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands.

Study Authority and History of Investigation

The WSLP LA HSDRR study was initiated by two authorizations, one by the House of Representatives in 1971 and another by the Senate in 1974. Several formulations and reports have been accomplished since the original authorizations. In 1996 Congress authorized funding for a general investigation into hurricane and flood protection in St. James, St. John the Baptist, and St. Charles parishes in the area west of the Bonne Carré Spillway as part of the Lake Pontchartrain and Vicinity, Louisiana Authority. Subsequently, a feasibility study was initiated and the preliminary findings were presented to the PLD and St. John Parish in 1998. One of the eight alignments from the preliminary findings and an additional alignment presented by the PLD were chosen for further investigation and in 2003, the USACE presented alignment and

cost options to the PLD and St. John the Baptist Parish for these two alternatives. No consensus could be reached on which alignment to pursue and the study was halted. In 2006, the PLD developed a third alignment for consideration by the USACE and St. John the Baptist Parish. A preliminary screening level analysis was completed in 2007, and the PLD and the USACE agreed to re-initiate the feasibility study and an EIS.

Study Area

The WSLP LA HSDRR study area is located in St. Charles, St. John the Baptist and St. James parishes, Louisiana (see enclosed Figure 1). The study area is bounded on the east by the west guide levee of the Bonnet Carré Spillway, on the north by Lake Pontchartrain and Lake Maurepas, on the west by the St. James Parish line and on the south by the Mississippi River. The study area includes residential, commercial, industrial and undeveloped land. The southern portion of the study contains the communities of LaPlace, Reserve, Garyville, Gramercy, Lutcher and Convent. Most of the northern portion is occupied by the Maurepas Swamp Wildlife Management Area and includes sections of Interstate Highway 10 (I-10) and I-55.

Proposed Alignments

Thirty-two alignments were identified and screened based on objectives and constraints and local conditions, including pipeline avoidance and storage and infrastructure concerns, reducing the number of alignments to twelve. These twelve alignments were ranked based on their ability to meet the study objectives and avoid constraints, and the top four alignments that met evaluation criteria were carried forward for evaluation. An additional non-structural alternative was developed.

The final array of alternatives include the No Action Alternative; Alternative A: Spillway to Hope Canal/Mississippi River and Non-Structural Alternative; Alternative C: Spillway to Hope Canal/MS River (Pipeline Avoidance) and Non-Structural Alternative; Alternative D: Spillway to Ascension Parish (I-10 Protection) without Non-Structural Alternative; and Alternative E: Non-Structural Alternative (see enclosed Figure 2).

Section 106 Consultation

This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). The majority of the authorized study area is within the Maurepas Swamp, although the study area also contains natural levee of the Mississippi River. Upon selection of the tentatively selected plan and the identification of historic properties, in accordance with 36 CFR § 800.4, the CEMVN will continue Section 106 consultation. Also enclosed is a copy of the 3 May 2013 CEMVN letter to the Louisiana State Historic Preservation Officer.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Mr. Robert Cast, Tribal Historic Preservation Officer, Caddo Nation of Oklahoma, rcast@caddonation.org.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

May 3, 2013

Regional Planning and
Environment Division, South

John Paul Darden, Chairman
Chitimacha Tribe of Louisiana
P.O. Box 661
Charenton, LA 70523

Dear Chairman Darden:

The United States Army Corps of Engineers (USACE) and the Pontchartrain Levee District (PLD) have initiated an investigation into the feasibility of providing hurricane and storm damage risk reduction to residents living in the area west of the Bonnet Carré Spillway between the Mississippi River and Lakes Pontchartrain and Maurepas and the St. James Parish line. The New Orleans District (CEMVN) is preparing a West Shore-Lake Pontchartrain (WSLP) Integrated Feasibility Study/Environmental Impact Statement (Integrated Report), which will describe all aspects of the WSLP Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) study, from its inception, through the evolution of the various alternatives, the discussion of potential impacts to all applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the WSLP LA HSDRR study, in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands.

Study Authority and History of Investigation

The WSLP LA HSDRR study was initiated by two authorizations, one by the House of Representatives in 1971 and another by the Senate in 1974. Several formulations and reports have been accomplished since the original authorizations. In 1996 Congress authorized funding for a general investigation into hurricane and flood protection in St. James, St. John the Baptist, and St. Charles parishes in the area west of the Bonne Carré Spillway as part of the Lake Pontchartrain and Vicinity, Louisiana Authority. Subsequently, a feasibility study was initiated and the preliminary findings were presented to the PLD and St. John Parish in 1998. One of the eight alignments from the preliminary findings and an additional alignment presented by the PLD were chosen for further investigation and in 2003, the USACE presented alignment and

cost options to the PLD and St. John the Baptist Parish for these two alternatives. No consensus could be reached on which alignment to pursue and the study was halted. In 2006, the PLD developed a third alignment for consideration by the USACE and St. John the Baptist Parish. A preliminary screening level analysis was completed in 2007, and the PLD and the USACE agreed to re-initiate the feasibility study and an EIS.

Study Area

The WSLP LA HSDRR study area is located in St. Charles, St. John the Baptist and St. James parishes, Louisiana (see enclosed Figure 1). The study area is bounded on the east by the west guide levee of the Bonnet Carré Spillway, on the north by Lake Pontchartrain and Lake Maurepas, on the west by the St. James Parish line and on the south by the Mississippi River. The study area includes residential, commercial, industrial and undeveloped land. The southern portion of the study contains the communities of LaPlace, Reserve, Garyville, Gramercy, Lutcher and Convent. Most of the northern portion is occupied by the Maurepas Swamp Wildlife Management Area and includes sections of Interstate Highway 10 (I-10) and I-55.

Proposed Alignments

Thirty-two alignments were identified and screened based on objectives and constraints and local conditions, including pipeline avoidance and storage and infrastructure concerns, reducing the number of alignments to twelve. These twelve alignments were ranked based on their ability to meet the study objectives and avoid constraints, and the top four alignments that met evaluation criteria were carried forward for evaluation. An additional non-structural alternative was developed.

The final array of alternatives include the No Action Alternative; Alternative A: Spillway to Hope Canal/Mississippi River and Non-Structural Alternative; Alternative C: Spillway to Hope Canal/MS River (Pipeline Avoidance) and Non-Structural Alternative; Alternative D: Spillway to Ascension Parish (I-10 Protection) without Non-Structural Alternative; and Alternative E: Non-Structural Alternative (see enclosed Figure 2).

Section 106 Consultation

This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). The majority of the authorized study area is within the Maurepas Swamp, although the study area also contains natural levee of the Mississippi River. Upon selection of the tentatively selected plan and the identification of historic properties, in accordance with 36 CFR § 800.4, the CEMVN will continue Section 106 consultation. Also enclosed is a copy of the 3 May 2013 CEMVN letter to the Louisiana State Historic Preservation Officer.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Mrs. Kimberly Walden, M. Ed., Cultural Director/Tribal Historic Preservation Officer, Chitimacha Tribe of Louisiana, kswalden@chitimacha.gov.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

May 3, 2013

Regional Planning and
Environment Division, South

Gregory E. Pyle, Chief
Choctaw Nation of Oklahoma
P.O. Box 1210
Durant, OK 74702-1210

Dear Chief Pyle:

The United States Army Corps of Engineers (USACE) and the Pontchartrain Levee District (PLD) have initiated an investigation into the feasibility of providing hurricane and storm damage risk reduction to residents living in the area west of the Bonnet Carré Spillway between the Mississippi River and Lakes Pontchartrain and Maurepas and the St. James Parish line. The New Orleans District (CEMVN) is preparing a West Shore-Lake Pontchartrain (WSLP) Integrated Feasibility Study/Environmental Impact Statement (Integrated Report), which will describe all aspects of the WSLP Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) study, from its inception, through the evolution of the various alternatives, the discussion of potential impacts to all applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the WSLP LA HSDRR study, in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands.

Study Authority and History of Investigation

The WSLP LA HSDRR study was initiated by two authorizations, one by the House of Representatives in 1971 and another by the Senate in 1974. Several formulations and reports have been accomplished since the original authorizations. In 1996 Congress authorized funding for a general investigation into hurricane and flood protection in St. James, St. John the Baptist, and St. Charles parishes in the area west of the Bonne Carré Spillway as part of the Lake Pontchartrain and Vicinity, Louisiana Authority. Subsequently, a feasibility study was initiated and the preliminary findings were presented to the PLD and St. John Parish in 1998. One of the eight alignments from the preliminary findings and an additional alignment presented by the PLD were chosen for further investigation and in 2003, the USACE presented alignment and

cost options to the PLD and St. John the Baptist Parish for these two alternatives. No consensus could be reached on which alignment to pursue and the study was halted. In 2006, the PLD developed a third alignment for consideration by the USACE and St. John the Baptist Parish. A preliminary screening level analysis was completed in 2007, and the PLD and the USACE agreed to re-initiate the feasibility study and an EIS.

Study Area

The WSLP LA HSDRR study area is located in St. Charles, St. John the Baptist and St. James parishes, Louisiana (see enclosed Figure 1). The study area is bounded on the east by the west guide levee of the Bonnet Carré Spillway, on the north by Lake Pontchartrain and Lake Maurepas, on the west by the St. James Parish line and on the south by the Mississippi River. The study area includes residential, commercial, industrial and undeveloped land. The southern portion of the study contains the communities of LaPlace, Reserve, Garyville, Gramercy, Lutcher and Convent. Most of the northern portion is occupied by the Maurepas Swamp Wildlife Management Area and includes sections of Interstate Highway 10 (I-10) and I-55.

Proposed Alignments

Thirty-two alignments were identified and screened based on objectives and constraints and local conditions, including pipeline avoidance and storage and infrastructure concerns, reducing the number of alignments to twelve. These twelve alignments were ranked based on their ability to meet the study objectives and avoid constraints, and the top four alignments that met evaluation criteria were carried forward for evaluation. An additional non-structural alternative was developed.

The final array of alternatives include the No Action Alternative; Alternative A: Spillway to Hope Canal/Mississippi River and Non-Structural Alternative; Alternative C: Spillway to Hope Canal/MS River (Pipeline Avoidance) and Non-Structural Alternative; Alternative D: Spillway to Ascension Parish (I-10 Protection) without Non-Structural Alternative; and Alternative E: Non-Structural Alternative (see enclosed Figure 2).

Section 106 Consultation

This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). The majority of the authorized study area is within the Maurepas Swamp, although the study area also contains natural levee of the Mississippi River. Upon selection of the tentatively selected plan and the identification of historic properties, in accordance with 36 CFR § 800.4, the CEMVN will continue Section 106 consultation. Also enclosed is a copy of the 3 May 2013 CEMVN letter to the Louisiana State Historic Preservation Officer.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Mr. Ian Thompson, Director/Tribal Historic Preservation Officer, Choctaw Nation of Oklahoma, ithompson@choctawnation.com.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

May 3, 2013

Regional Planning and
Environment Division, South

Kevin Sickey, Chief
Coushatta Tribe of Louisiana
P.O. Box 818
Elton, LA 70532

Dear Chief Sickey:

The United States Army Corps of Engineers (USACE) and the Pontchartrain Levee District (PLD) have initiated an investigation into the feasibility of providing hurricane and storm damage risk reduction to residents living in the area west of the Bonnet Carré Spillway between the Mississippi River and Lakes Pontchartrain and Maurepas and the St. James Parish line. The New Orleans District (CEMVN) is preparing a West Shore-Lake Pontchartrain (WSLP) Integrated Feasibility Study/Environmental Impact Statement (Integrated Report), which will describe all aspects of the WSLP Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) study, from its inception, through the evolution of the various alternatives, the discussion of potential impacts to all applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the WSLP LA HSDRR study, in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands.

Study Authority and History of Investigation

The WSLP LA HSDRR study was initiated by two authorizations, one by the House of Representatives in 1971 and another by the Senate in 1974. Several formulations and reports have been accomplished since the original authorizations. In 1996 Congress authorized funding for a general investigation into hurricane and flood protection in St. James, St. John the Baptist, and St. Charles parishes in the area west of the Bonne Carré Spillway as part of the Lake Pontchartrain and Vicinity, Louisiana Authority. Subsequently, a feasibility study was initiated and the preliminary findings were presented to the PLD and St. John Parish in 1998. One of the eight alignments from the preliminary findings and an additional alignment presented by the PLD were chosen for further investigation and in 2003, the USACE presented alignment and

cost options to the PLD and St. John the Baptist Parish for these two alternatives. No consensus could be reached on which alignment to pursue and the study was halted. In 2006, the PLD developed a third alignment for consideration by the USACE and St. John the Baptist Parish. A preliminary screening level analysis was completed in 2007, and the PLD and the USACE agreed to re-initiate the feasibility study and an EIS.

Study Area

The WSLP LA HSDRR study area is located in St. Charles, St. John the Baptist and St. James parishes, Louisiana (see enclosed Figure 1). The study area is bounded on the east by the west guide levee of the Bonnet Carré Spillway, on the north by Lake Pontchartrain and Lake Maurepas, on the west by the St. James Parish line and on the south by the Mississippi River. The study area includes residential, commercial, industrial and undeveloped land. The southern portion of the study contains the communities of LaPlace, Reserve, Garyville, Gramercy, Lutcher and Convent. Most of the northern portion is occupied by the Maurepas Swamp Wildlife Management Area and includes sections of Interstate Highway 10 (I-10) and I-55.

Proposed Alignments

Thirty-two alignments were identified and screened based on objectives and constraints and local conditions, including pipeline avoidance and storage and infrastructure concerns, reducing the number of alignments to twelve. These twelve alignments were ranked based on their ability to meet the study objectives and avoid constraints, and the top four alignments that met evaluation criteria were carried forward for evaluation. An additional non-structural alternative was developed.

The final array of alternatives include the No Action Alternative; Alternative A: Spillway to Hope Canal/Mississippi River and Non-Structural Alternative; Alternative C: Spillway to Hope Canal/MS River (Pipeline Avoidance) and Non-Structural Alternative; Alternative D: Spillway to Ascension Parish (I-10 Protection) without Non-Structural Alternative; and Alternative E: Non-Structural Alternative (see enclosed Figure 2).

Section 106 Consultation

This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). The majority of the authorized study area is within the Maurepas Swamp, although the study area also contains natural levee of the Mississippi River. Upon selection of the tentatively selected plan and the identification of historic properties, in accordance with 36 CFR § 800.4, the CEMVN will continue Section 106 consultation. Also enclosed is a copy of the 3 May 2013 CEMVN letter to the Louisiana State Historic Preservation Officer.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Dr. Linda Langley, Tribal Historic Preservation Officer, Coushatta Tribe of Louisiana, llangley@mcneese.edu, and Mr. Michael Tarpley, Deputy Tribal Historic Preservation Officer, Coushatta Tribe of Louisiana, kokua.aina57@gmail.com.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

May 3, 2013

Regional Planning and
Environment Division, South

B. Cheryl Smith, Principal Chief
Jena Band of Choctaw Indians
P.O. Box 14
Jena, LA 71342

Dear Principal Chief Smith:

The United States Army Corps of Engineers (USACE) and the Pontchartrain Levee District (PLD) have initiated an investigation into the feasibility of providing hurricane and storm damage risk reduction to residents living in the area west of the Bonnet Carré Spillway between the Mississippi River and Lakes Pontchartrain and Maurepas and the St. James Parish line. The New Orleans District (CEMVN) is preparing a West Shore-Lake Pontchartrain (WSLP) Integrated Feasibility Study/Environmental Impact Statement (Integrated Report), which will describe all aspects of the WSLP Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) study, from its inception, through the evolution of the various alternatives, the discussion of potential impacts to all applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the WSLP LA HSDRR study, in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands.

Study Authority and History of Investigation

The WSLP LA HSDRR study was initiated by two authorizations, one by the House of Representatives in 1971 and another by the Senate in 1974. Several formulations and reports have been accomplished since the original authorizations. In 1996 Congress authorized funding for a general investigation into hurricane and flood protection in St. James, St. John the Baptist, and St. Charles parishes in the area west of the Bonne Carré Spillway as part of the Lake Pontchartrain and Vicinity, Louisiana Authority. Subsequently, a feasibility study was initiated and the preliminary findings were presented to the PLD and St. John Parish in 1998. One of the eight alignments from the preliminary findings and an additional alignment presented by the PLD were chosen for further investigation and in 2003, the USACE presented alignment and

cost options to the PLD and St. John the Baptist Parish for these two alternatives. No consensus could be reached on which alignment to pursue and the study was halted. In 2006, the PLD developed a third alignment for consideration by the USACE and St. John the Baptist Parish. A preliminary screening level analysis was completed in 2007, and the PLD and the USACE agreed to re-initiate the feasibility study and an EIS.

Study Area

The WSLP LA HSDRR study area is located in St. Charles, St. John the Baptist and St. James parishes, Louisiana (see enclosed Figure 1). The study area is bounded on the east by the west guide levee of the Bonnet Carré Spillway, on the north by Lake Pontchartrain and Lake Maurepas, on the west by the St. James Parish line and on the south by the Mississippi River. The study area includes residential, commercial, industrial and undeveloped land. The southern portion of the study contains the communities of LaPlace, Reserve, Garyville, Gramercy, Lutcher and Convent. Most of the northern portion is occupied by the Maurepas Swamp Wildlife Management Area and includes sections of Interstate Highway 10 (I-10) and I-55.

Proposed Alignments

Thirty-two alignments were identified and screened based on objectives and constraints and local conditions, including pipeline avoidance and storage and infrastructure concerns, reducing the number of alignments to twelve. These twelve alignments were ranked based on their ability to meet the study objectives and avoid constraints, and the top four alignments that met evaluation criteria were carried forward for evaluation. An additional non-structural alternative was developed.

The final array of alternatives include the No Action Alternative; Alternative A: Spillway to Hope Canal/Mississippi River and Non-Structural Alternative; Alternative C: Spillway to Hope Canal/MS River (Pipeline Avoidance) and Non-Structural Alternative; Alternative D: Spillway to Ascension Parish (I-10 Protection) without Non-Structural Alternative; and Alternative E: Non-Structural Alternative (see enclosed Figure 2).

Section 106 Consultation

This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). The majority of the authorized study area is within the Maurepas Swamp, although the study area also contains natural levee of the Mississippi River. Upon selection of the tentatively selected plan and the identification of historic properties, in accordance with 36 CFR § 800.4, the CEMVN will continue Section 106 consultation. Also enclosed is a copy of the 3 May 2013 CEMVN letter to the Louisiana State Historic Preservation Officer.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Ms. Dana Masters, Tribal Historic Preservation Officer, Jena Band of Choctaw Indians, jbc.thpo106@aol.com, and Ms. Lillie McCormick, Environmental Director, Jena Band of Choctaw Indians, lmmccormickjbc@centurytel.net.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

May 3, 2013

Regional Planning and
Environment Division, South

Phyliss J. Anderson, Chief
Mississippi Band of Choctaw Indians
P.O. Box 6257
Choctaw, MS 39350

Dear Chief Anderson:

The United States Army Corps of Engineers (USACE) and the Pontchartrain Levee District (PLD) have initiated an investigation into the feasibility of providing hurricane and storm damage risk reduction to residents living in the area west of the Bonnet Carré Spillway between the Mississippi River and Lakes Pontchartrain and Maurepas and the St. James Parish line. The New Orleans District (CEMVN) is preparing a West Shore-Lake Pontchartrain (WSLP) Integrated Feasibility Study/Environmental Impact Statement (Integrated Report), which will describe all aspects of the WSLP Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) study, from its inception, through the evolution of the various alternatives, the discussion of potential impacts to all applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the WSLP LA HSDRR study, in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands.

Study Authority and History of Investigation

The WSLP LA HSDRR study was initiated by two authorizations, one by the House of Representatives in 1971 and another by the Senate in 1974. Several formulations and reports have been accomplished since the original authorizations. In 1996 Congress authorized funding for a general investigation into hurricane and flood protection in St. James, St. John the Baptist, and St. Charles parishes in the area west of the Bonne Carré Spillway as part of the Lake Pontchartrain and Vicinity, Louisiana Authority. Subsequently, a feasibility study was initiated and the preliminary findings were presented to the PLD and St. John Parish in 1998. One of the eight alignments from the preliminary findings and an additional alignment presented by the PLD were chosen for further investigation and in 2003, the USACE presented alignment and

cost options to the PLD and St. John the Baptist Parish for these two alternatives. No consensus could be reached on which alignment to pursue and the study was halted. In 2006, the PLD developed a third alignment for consideration by the USACE and St. John the Baptist Parish. A preliminary screening level analysis was completed in 2007, and the PLD and the USACE agreed to re-initiate the feasibility study and an EIS.

Study Area

The WSLP LA HSDRR study area is located in St. Charles, St. John the Baptist and St. James parishes, Louisiana (see enclosed Figure 1). The study area is bounded on the east by the west guide levee of the Bonnet Carré Spillway, on the north by Lake Pontchartrain and Lake Maurepas, on the west by the St. James Parish line and on the south by the Mississippi River. The study area includes residential, commercial, industrial and undeveloped land. The southern portion of the study contains the communities of LaPlace, Reserve, Garyville, Gramercy, Lutcher and Convent. Most of the northern portion is occupied by the Maurepas Swamp Wildlife Management Area and includes sections of Interstate Highway 10 (I-10) and I-55.

Proposed Alignments

Thirty-two alignments were identified and screened based on objectives and constraints and local conditions, including pipeline avoidance and storage and infrastructure concerns, reducing the number of alignments to twelve. These twelve alignments were ranked based on their ability to meet the study objectives and avoid constraints, and the top four alignments that met evaluation criteria were carried forward for evaluation. An additional non-structural alternative was developed.

The final array of alternatives include the No Action Alternative; Alternative A: Spillway to Hope Canal/Mississippi River and Non-Structural Alternative; Alternative C: Spillway to Hope Canal/MS River (Pipeline Avoidance) and Non-Structural Alternative; Alternative D: Spillway to Ascension Parish (I-10 Protection) without Non-Structural Alternative; and Alternative E: Non-Structural Alternative (see enclosed Figure 2).

Section 106 Consultation

This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). The majority of the authorized study area is within the Maurepas Swamp, although the study area also contains natural levee of the Mississippi River. Upon selection of the tentatively selected plan and the identification of historic properties, in accordance with 36 CFR § 800.4, the CEMVN will continue Section 106 consultation. Also enclosed is a copy of the 3 May 2013 CEMVN letter to the Louisiana State Historic Preservation Officer.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Mr. Kenneth H. Carleton, Tribal Historic Preservation Officer/ Archaeologist, Mississippi Band of Choctaw Indians, kcarleton@choctaw.org.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

May 3, 2013

Regional Planning and
Environment Division, South

John Berrey, Chairman
Quapaw Tribe of Oklahoma
P.O. Box 765
Quapaw, OK 74363

Dear Chairman Berrey:

The United States Army Corps of Engineers (USACE) and the Pontchartrain Levee District (PLD) have initiated an investigation into the feasibility of providing hurricane and storm damage risk reduction to residents living in the area west of the Bonnet Carré Spillway between the Mississippi River and Lakes Pontchartrain and Maurepas and the St. James Parish line. The New Orleans District (CEMVN) is preparing a West Shore-Lake Pontchartrain (WSLP) Integrated Feasibility Study/Environmental Impact Statement (Integrated Report), which will describe all aspects of the WSLP Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) study, from its inception, through the evolution of the various alternatives, the discussion of potential impacts to all applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the WSLP LA HSDRR study, in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands.

Study Authority and History of Investigation

The WSLP LA HSDRR study was initiated by two authorizations, one by the House of Representatives in 1971 and another by the Senate in 1974. Several formulations and reports have been accomplished since the original authorizations. In 1996 Congress authorized funding for a general investigation into hurricane and flood protection in St. James, St. John the Baptist, and St. Charles parishes in the area west of the Bonne Carré Spillway as part of the Lake Pontchartrain and Vicinity, Louisiana Authority. Subsequently, a feasibility study was initiated and the preliminary findings were presented to the PLD and St. John Parish in 1998. One of the eight alignments from the preliminary findings and an additional alignment presented by the PLD were chosen for further investigation and in 2003, the USACE presented alignment and

cost options to the PLD and St. John the Baptist Parish for these two alternatives. No consensus could be reached on which alignment to pursue and the study was halted. In 2006, the PLD developed a third alignment for consideration by the USACE and St. John the Baptist Parish. A preliminary screening level analysis was completed in 2007, and the PLD and the USACE agreed to re-initiate the feasibility study and an EIS.

Study Area

The WSLP LA HSDRR study area is located in St. Charles, St. John the Baptist and St. James parishes, Louisiana (see enclosed Figure 1). The study area is bounded on the east by the west guide levee of the Bonnet Carré Spillway, on the north by Lake Pontchartrain and Lake Maurepas, on the west by the St. James Parish line and on the south by the Mississippi River. The study area includes residential, commercial, industrial and undeveloped land. The southern portion of the study contains the communities of LaPlace, Reserve, Garyville, Gramercy, Lutcher and Convent. Most of the northern portion is occupied by the Maurepas Swamp Wildlife Management Area and includes sections of Interstate Highway 10 (I-10) and I-55.

Proposed Alignments

Thirty-two alignments were identified and screened based on objectives and constraints and local conditions, including pipeline avoidance and storage and infrastructure concerns, reducing the number of alignments to twelve. These twelve alignments were ranked based on their ability to meet the study objectives and avoid constraints, and the top four alignments that met evaluation criteria were carried forward for evaluation. An additional non-structural alternative was developed.

The final array of alternatives include the No Action Alternative; Alternative A: Spillway to Hope Canal/Mississippi River and Non-Structural Alternative; Alternative C: Spillway to Hope Canal/MS River (Pipeline Avoidance) and Non-Structural Alternative; Alternative D: Spillway to Ascension Parish (I-10 Protection) without Non-Structural Alternative; and Alternative E: Non-Structural Alternative (see enclosed Figure 2).

Section 106 Consultation

This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). The majority of the authorized study area is within the Maurepas Swamp, although the study area also contains natural levee of the Mississippi River. Upon selection of the tentatively selected plan and the identification of historic properties, in accordance with 36 CFR § 800.4, the CEMVN will continue Section 106 consultation. Also enclosed is a copy of the 3 May 2013 CEMVN letter to the Louisiana State Historic Preservation Officer.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Ms. Jean Ann Lambert, Tribal Historic Preservation Officer, Quapaw Tribe of Oklahoma, jlambert@quapawtribe.com.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

May 3, 2013

Regional Planning and
Environment Division, South

Leonard M. Harjo, Principal Chief
Seminole Nation of Oklahoma
P.O. Box 1498
Wewoka, OK 74884

Dear Principal Chief Harjo:

The United States Army Corps of Engineers (USACE) and the Pontchartrain Levee District (PLD) have initiated an investigation into the feasibility of providing hurricane and storm damage risk reduction to residents living in the area west of the Bonnet Carré Spillway between the Mississippi River and Lakes Pontchartrain and Maurepas and the St. James Parish line. The New Orleans District (CEMVN) is preparing a West Shore-Lake Pontchartrain (WSLP) Integrated Feasibility Study/Environmental Impact Statement (Integrated Report), which will describe all aspects of the WSLP Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) study, from its inception, through the evolution of the various alternatives, the discussion of potential impacts to all applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the WSLP LA HSDRR study, in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands.

Study Authority and History of Investigation

The WSLP LA HSDRR study was initiated by two authorizations, one by the House of Representatives in 1971 and another by the Senate in 1974. Several formulations and reports have been accomplished since the original authorizations. In 1996 Congress authorized funding for a general investigation into hurricane and flood protection in St. James, St. John the Baptist, and St. Charles parishes in the area west of the Bonne Carré Spillway as part of the Lake Pontchartrain and Vicinity, Louisiana Authority. Subsequently, a feasibility study was initiated and the preliminary findings were presented to the PLD and St. John Parish in 1998. One of the eight alignments from the preliminary findings and an additional alignment presented by the PLD were chosen for further investigation and in 2003, the USACE presented alignment and

cost options to the PLD and St. John the Baptist Parish for these two alternatives. No consensus could be reached on which alignment to pursue and the study was halted. In 2006, the PLD developed a third alignment for consideration by the USACE and St. John the Baptist Parish. A preliminary screening level analysis was completed in 2007, and the PLD and the USACE agreed to re-initiate the feasibility study and an EIS.

Study Area

The WSLP LA HSDRR study area is located in St. Charles, St. John the Baptist and St. James parishes, Louisiana (see enclosed Figure 1). The study area is bounded on the east by the west guide levee of the Bonnet Carré Spillway, on the north by Lake Pontchartrain and Lake Maurepas, on the west by the St. James Parish line and on the south by the Mississippi River. The study area includes residential, commercial, industrial and undeveloped land. The southern portion of the study contains the communities of LaPlace, Reserve, Garyville, Gramercy, Lutcher and Convent. Most of the northern portion is occupied by the Maurepas Swamp Wildlife Management Area and includes sections of Interstate Highway 10 (I-10) and I-55.

Proposed Alignments

Thirty-two alignments were identified and screened based on objectives and constraints and local conditions, including pipeline avoidance and storage and infrastructure concerns, reducing the number of alignments to twelve. These twelve alignments were ranked based on their ability to meet the study objectives and avoid constraints, and the top four alignments that met evaluation criteria were carried forward for evaluation. An additional non-structural alternative was developed.

The final array of alternatives include the No Action Alternative; Alternative A: Spillway to Hope Canal/Mississippi River and Non-Structural Alternative; Alternative C: Spillway to Hope Canal/MS River (Pipeline Avoidance) and Non-Structural Alternative; Alternative D: Spillway to Ascension Parish (I-10 Protection) without Non-Structural Alternative; and Alternative E: Non-Structural Alternative (see enclosed Figure 2).

Section 106 Consultation

This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). The majority of the authorized study area is within the Maurepas Swamp, although the study area also contains natural levee of the Mississippi River. Upon selection of the tentatively selected plan and the identification of historic properties, in accordance with 36 CFR § 800.4, the CEMVN will continue Section 106 consultation. Also enclosed is a copy of the 3 May 2013 CEMVN letter to the Louisiana State Historic Preservation Officer.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Ms. Natalie Harjo, Tribal Historic Preservation Officer, Seminole Nation of Oklahoma, harjo.n@sno-nsn.gov.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

May 3, 2013

Regional Planning and
Environment Division, South

James Billie, Chairman
Seminole Tribe of Florida
6300 Stirling Road
Hollywood, FL 33024

Dear Chairman Billie:

The United States Army Corps of Engineers (USACE) and the Pontchartrain Levee District (PLD) have initiated an investigation into the feasibility of providing hurricane and storm damage risk reduction to residents living in the area west of the Bonnet Carré Spillway between the Mississippi River and Lakes Pontchartrain and Maurepas and the St. James Parish line. The New Orleans District (CEMVN) is preparing a West Shore-Lake Pontchartrain (WSLP) Integrated Feasibility Study/Environmental Impact Statement (Integrated Report), which will describe all aspects of the WSLP Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) study, from its inception, through the evolution of the various alternatives, the discussion of potential impacts to all applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the WSLP LA HSDRR study, in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands.

Study Authority and History of Investigation

The WSLP LA HSDRR study was initiated by two authorizations, one by the House of Representatives in 1971 and another by the Senate in 1974. Several formulations and reports have been accomplished since the original authorizations. In 1996 Congress authorized funding for a general investigation into hurricane and flood protection in St. James, St. John the Baptist, and St. Charles parishes in the area west of the Bonne Carré Spillway as part of the Lake Pontchartrain and Vicinity, Louisiana Authority. Subsequently, a feasibility study was initiated and the preliminary findings were presented to the PLD and St. John Parish in 1998. One of the eight alignments from the preliminary findings and an additional alignment presented by the PLD were chosen for further investigation and in 2003, the USACE presented alignment and

cost options to the PLD and St. John the Baptist Parish for these two alternatives. No consensus could be reached on which alignment to pursue and the study was halted. In 2006, the PLD developed a third alignment for consideration by the USACE and St. John the Baptist Parish. A preliminary screening level analysis was completed in 2007, and the PLD and the USACE agreed to re-initiate the feasibility study and an EIS.

Study Area

The WSLP LA HSDRR study area is located in St. Charles, St. John the Baptist and St. James parishes, Louisiana (see enclosed Figure 1). The study area is bounded on the east by the west guide levee of the Bonnet Carré Spillway, on the north by Lake Pontchartrain and Lake Maurepas, on the west by the St. James Parish line and on the south by the Mississippi River. The study area includes residential, commercial, industrial and undeveloped land. The southern portion of the study contains the communities of LaPlace, Reserve, Garyville, Gramercy, Lutcher and Convent. Most of the northern portion is occupied by the Maurepas Swamp Wildlife Management Area and includes sections of Interstate Highway 10 (I-10) and I-55.

Proposed Alignments

Thirty-two alignments were identified and screened based on objectives and constraints and local conditions, including pipeline avoidance and storage and infrastructure concerns, reducing the number of alignments to twelve. These twelve alignments were ranked based on their ability to meet the study objectives and avoid constraints, and the top four alignments that met evaluation criteria were carried forward for evaluation. An additional non-structural alternative was developed.

The final array of alternatives include the No Action Alternative; Alternative A: Spillway to Hope Canal/Mississippi River and Non-Structural Alternative; Alternative C: Spillway to Hope Canal/MS River (Pipeline Avoidance) and Non-Structural Alternative; Alternative D: Spillway to Ascension Parish (I-10 Protection) without Non-Structural Alternative; and Alternative E: Non-Structural Alternative (see enclosed Figure 2).

Section 106 Consultation

This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). The majority of the authorized study area is within the Maurepas Swamp, although the study area also contains natural levee of the Mississippi River. Upon selection of the tentatively selected plan and the identification of historic properties, in accordance with 36 CFR § 800.4, the CEMVN will continue Section 106 consultation. Also enclosed is a copy of the 3 May 2013 CEMVN letter to the Louisiana State Historic Preservation Officer.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Mr. Paul N. Backhouse, Tribal Historic Preservation Officer, Seminole Tribe of Florida, paulbackhouse@semtribe.com; Ms. Anne Mullins, Deputy Tribal Historic Preservation Officer, annemullins@semtribe.com; Mr. Bradley Mueller, Compliance Review Supervisor, bradleymueller@semtribe.com; Mr. Elliott York, Compliance Review and Data Analyst, elliottyork@semtribe.com; and Ms. Alison Swing, Compliance Review Data Analyst, alisonswing@semtribe.com.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

May 3, 2013

Regional Planning and
Environment Division, South

Earl J. Barbry, Sr., Chairman
Tunica-Biloxi Tribe of Louisiana
P.O. Box 1589
Marksville, LA 71351

Dear Chairman Barbry:

The United States Army Corps of Engineers (USACE) and the Pontchartrain Levee District (PLD) have initiated an investigation into the feasibility of providing hurricane and storm damage risk reduction to residents living in the area west of the Bonnet Carré Spillway between the Mississippi River and Lakes Pontchartrain and Maurepas and the St. James Parish line. The New Orleans District (CEMVN) is preparing a West Shore-Lake Pontchartrain (WSLP) Integrated Feasibility Study/Environmental Impact Statement (Integrated Report), which will describe all aspects of the WSLP Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) study, from its inception, through the evolution of the various alternatives, the discussion of potential impacts to all applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the WSLP LA HSDRR study, in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands.

Study Authority and History of Investigation

The WSLP LA HSDRR study was initiated by two authorizations, one by the House of Representatives in 1971 and another by the Senate in 1974. Several formulations and reports have been accomplished since the original authorizations. In 1996 Congress authorized funding for a general investigation into hurricane and flood protection in St. James, St. John the Baptist, and St. Charles parishes in the area west of the Bonne Carré Spillway as part of the Lake Pontchartrain and Vicinity, Louisiana Authority. Subsequently, a feasibility study was initiated and the preliminary findings were presented to the PLD and St. John Parish in 1998. One of the eight alignments from the preliminary findings and an additional alignment presented by the PLD were chosen for further investigation and in 2003, the USACE presented alignment and

cost options to the PLD and St. John the Baptist Parish for these two alternatives. No consensus could be reached on which alignment to pursue and the study was halted. In 2006, the PLD developed a third alignment for consideration by the USACE and St. John the Baptist Parish. A preliminary screening level analysis was completed in 2007, and the PLD and the USACE agreed to re-initiate the feasibility study and an EIS.

Study Area

The WSLP LA HSDRR study area is located in St. Charles, St. John the Baptist and St. James parishes, Louisiana (see enclosed Figure 1). The study area is bounded on the east by the west guide levee of the Bonnet Carré Spillway, on the north by Lake Pontchartrain and Lake Maurepas, on the west by the St. James Parish line and on the south by the Mississippi River. The study area includes residential, commercial, industrial and undeveloped land. The southern portion of the study contains the communities of LaPlace, Reserve, Garyville, Gramercy, Lutcher and Convent. Most of the northern portion is occupied by the Maurepas Swamp Wildlife Management Area and includes sections of Interstate Highway 10 (I-10) and I-55.

Proposed Alignments

Thirty-two alignments were identified and screened based on objectives and constraints and local conditions, including pipeline avoidance and storage and infrastructure concerns, reducing the number of alignments to twelve. These twelve alignments were ranked based on their ability to meet the study objectives and avoid constraints, and the top four alignments that met evaluation criteria were carried forward for evaluation. An additional non-structural alternative was developed.

The final array of alternatives include the No Action Alternative; Alternative A: Spillway to Hope Canal/Mississippi River and Non-Structural Alternative; Alternative C: Spillway to Hope Canal/MS River (Pipeline Avoidance) and Non-Structural Alternative; Alternative D: Spillway to Ascension Parish (I-10 Protection) without Non-Structural Alternative; and Alternative E: Non-Structural Alternative (see enclosed Figure 2).

Section 106 Consultation

This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). The majority of the authorized study area is within the Maurepas Swamp, although the study area also contains natural levee of the Mississippi River. Upon selection of the tentatively selected plan and the identification of historic properties, in accordance with 36 CFR § 800.4, the CEMVN will continue Section 106 consultation. Also enclosed is a copy of the 3 May 2013 CEMVN letter to the Louisiana State Historic Preservation Officer.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. You may also contact the project archaeologist Dr. Paul Hughbanks with any questions or comments at (504) 862-1100 or Paul.J.Hughbanks@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Mr. Earl Barbry, Jr., Cultural Director, Tunica-Biloxi Tribe of Louisiana, earlii@tunica.org.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

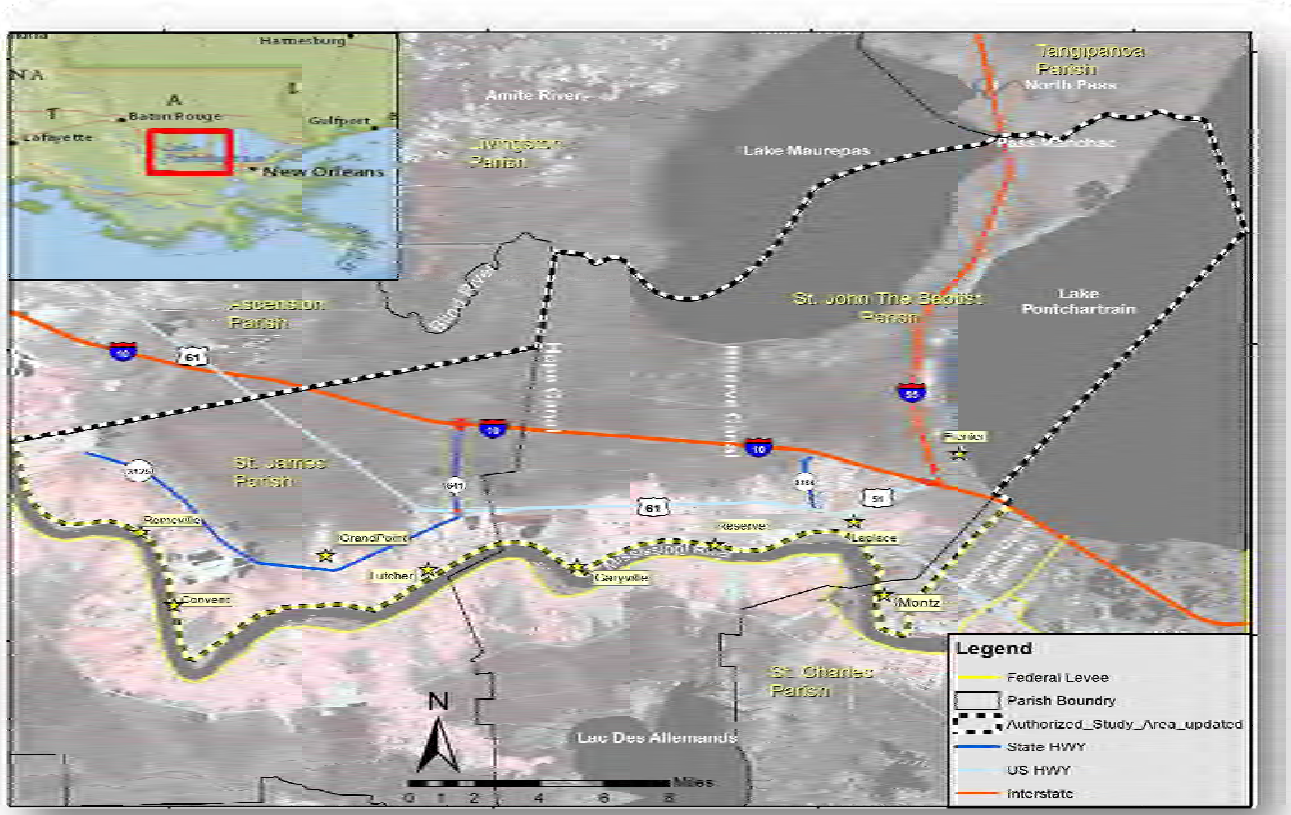


Figure 1. West Shore-Lake Pontchartrain Louisiana Hurricane and Storm Damage Risk Reduction Study Area.

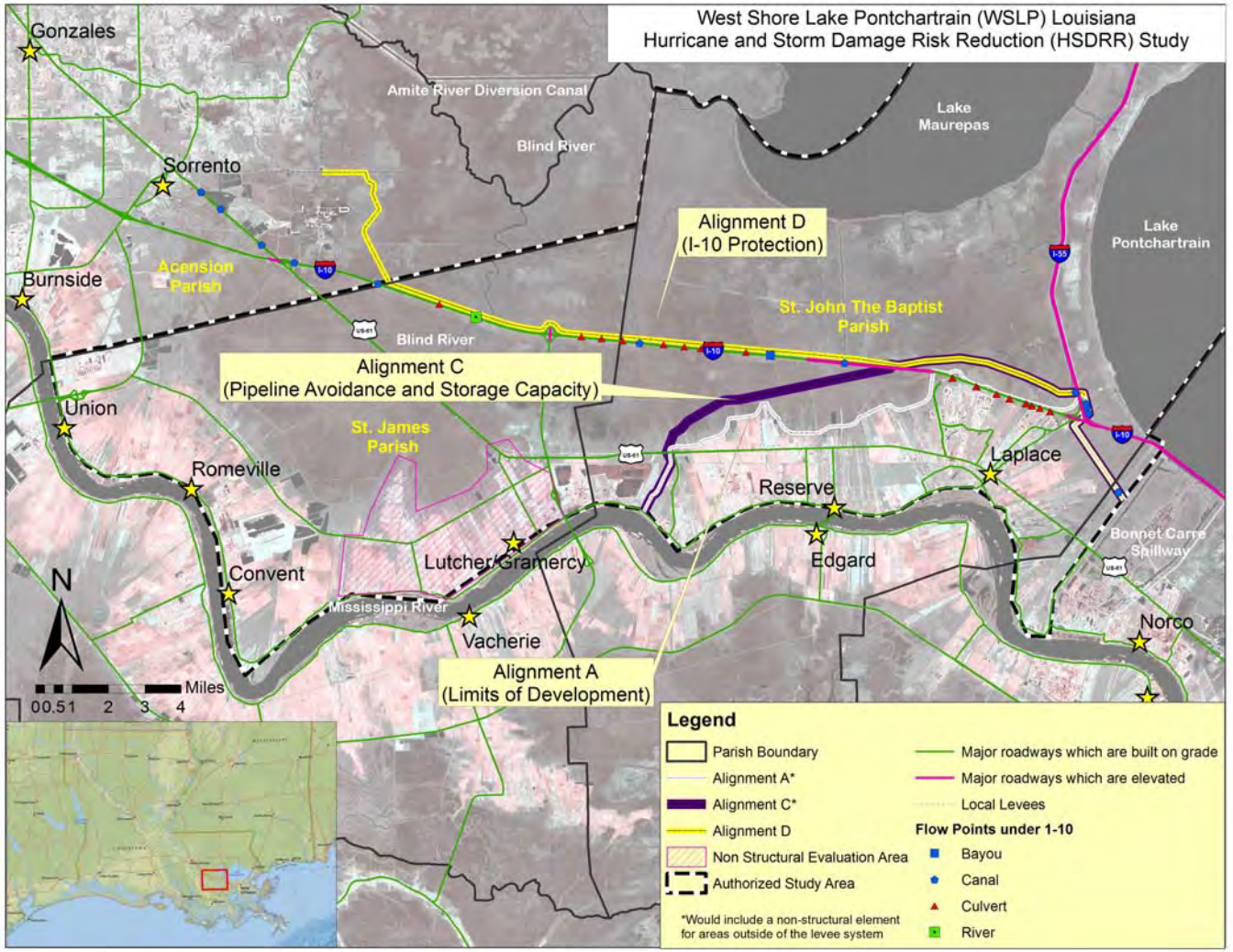


Figure 2. West Shore-Lake Pontchartrain Louisiana Hurricane and Storm Damage Risk Reduction Study Final Array of Alternatives.

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex G

U.S. Fish and Wildlife Service Final Coordination Act Report

Dayan, Nathan S MVN

From: Breaux, Catherine M MVN
Sent: Monday, May 12, 2014 9:50 AM
To: Dayan, Nathan S MVN; Walther, David
Cc: Stiles, Sandra E MVN; Gilmore, Tammy H MVN
Subject: RE: Change to the mitigation plan. (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Nathan,

Thanks for continuing to coordinate with us. As stated below the mitigation plan has been changed to eliminate the Milton component and replacing those mitigation needs by expanding the Lutcher Farmland component. The Service agrees with this change and has no need to develop a Supplemental FWCA letter in response to this mitigation change. We appreciate your continued coordination in regards to the Sprague's pipit.

Thanks,

Cathy Breaux (CEMVN-PD-P)
Fish and Wildlife Service
PO Box 60267
(504) 862-2689
(504) 862-1892

-----Original Message-----
From: Dayan, Nathan S MVN
Sent: Saturday, May 10, 2014 4:55 PM
To: Breaux, Catherine M MVN; Walther, David
Cc: Stiles, Sandra E MVN; Gilmore, Tammy H MVN
Subject: Change to the mitigation plan. (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Cathy/Dave
Please see the update mitigation plan. The Milton component was eliminated and the equivalent AAAHUs (131) were found by expanding the Lutcher Farmland component. 445 acres of open water will not be converted to swamp rather an additional 302 acres of farmland (348 total acres) will be converted to swamp.

We have determined that the farm fields may be suitable habitat for the candidate species Sprague’s pipit. If any of these birds are present they would be forced to permanently relocate. The USACE will consult with USFWS when the species is listed.

Please inform us if an this change will require an addendum to Final CAR? If so I really need it by Wed morning.

Nathan Dayan
Fishery Biologist
RTS Environmental Compliance
US Army Corps of Engineers

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

April 28, 2014

Colonel Richard R. Hansen
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Hansen:

Please reference the "West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study." The study was authorized by resolutions adopted by the U.S. House Committee on Public Works on July 29, 1971, and the U.S. Senate Committee on Public Works September 20, 1974. The Fish and Wildlife Service (Service) has prepared five Planning-Aid Reports dated January 21, 1985, June 30, 1987, April 3, 1997, May 4, 2001, and October 9, 2012, for previous reconnaissance studies, one letter for a Notice of Intent dated January 9, 2009, and a Draft Fish and Wildlife Coordination Act (FWCA) Report in June 2013.

This final report contains a description of existing fish and wildlife resources in the project area, discusses future with-project (FWP) and future without-project (FWOP) habitat conditions, identifies fish and wildlife-related impacts, and provides recommendations to improve the proposed West Shore, Lake Pontchartrain project. This report constitutes the final report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Service has coordinated with National Marine Fisheries (NMFS) and Louisiana Department of Wildlife and Fisheries (LDWF); their comments have been incorporated into this final report.

We appreciate the cooperation of your staff on this study. Should your staff have any questions regarding the enclosed report, please have them contact Ms. Catherine Breaux (504/862-2689) of this office.

Sincerely,

Jeffrey D. Weller
Supervisor
Louisiana Ecological Services Office

Enclosures

cc: Environmental Protection Agency, Dallas, TX
LA Dept. of Natural Resources (CMD), Baton Rouge, LA
Coastal Protection and Restoration Authority (CPRA), Baton Rouge, La
Natural Resources Conservation Service, Alexandria, LA
Pontchartrain Levee District, Lutcher, LA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

April 28, 2014

Robert Barham
Secretary
Louisiana Department of Wildlife and Fisheries
Post Office Box 98000
Baton Rouge, Louisiana 70898-9000

Dear Mr. Barham:

Attached is the Final Fish and Wildlife Coordination Act Report on the "West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study." This report constitutes the final report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Fish and Wildlife Service has incorporated your agency's comments into the final report prior to its submission to the U.S. Army Corps of Engineers. Should your staff have any questions regarding this report, please have them contact Catherine Breaux (504/862-2689) of this office.

Sincerely,

for Jeffrey D. Weller
Supervisor
Louisiana Ecological Services Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

April 28, 2014

Mr. Richard Hartman
Branch Chief
Habitat Conservation Division
National Marine Fisheries Service
c/o Louisiana State University
Baton Rouge, Louisiana 70803-7535

Dear Mr. Hartman:

Attached is the Final Fish and Wildlife Coordination Act Report on the "West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study." This report constitutes the final report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Fish and Wildlife Service has incorporated your agency's comments into the final report prior to its submission to the U.S. Army Corps of Engineers. Should your staff have any questions regarding this report, please have them contact Catherine Breaux (504/862-2689) of this office.

Sincerely,

Jeffrey D. Weller
Supervisor
Louisiana Ecological Services Office

Final Fish and Wildlife Coordination Act Report
for the
West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study in Ascension, St. Charles, St. James, and St. John the Baptist Parishes, Louisiana

SUBMITTED TO
NEW ORLEANS DISTRICT
U.S. ARMY CORPS OF ENGINEERS
AND
PONTCHARTRAIN LEVEE DISTRICT

PREPARED BY
CATHERINE BREAUX
FISH AND WILDLIFE BIOLOGIST

U.S. FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
LAFAYETTE, LOUISIANA
APRIL 2014
U.S. FISH AND WILDLIFE SERVICE – SOUTHEAST REGION

TABLE OF CONTENTS

FIGURES AND TABLES 1
INTRODUCTION 2
DESCRIPTION OF FISH AND WILDLIFE RESOURCE CONDITIONS 4
Threatened and Endangered Species 6
Candidate Species 7
Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA) 7
Managed Areas and Restoration Projects 8
EVALUATION METHODOLOGY 8
PROJECT IMPACTS 9
SERVICE POSITION AND RECOMMENDATIONS 13
LITERATURE CITED 18
Appendix A 19

FIGURES AND TABLES

Figure 1. Proposed alignments for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study 3

Table 1. West Shore Lake Pontchartrain Acres Summary of Unavoidable Direct and Indirect Impacts for Intermediate Relative Sea Level Rise. 10

Table 2. Unavoidable Direct and Indirect Impacts to the Maurepas Swamp Wildlife Management Area Determined Under Intermediate Relative Sea Level Rise. 11

INTRODUCTION

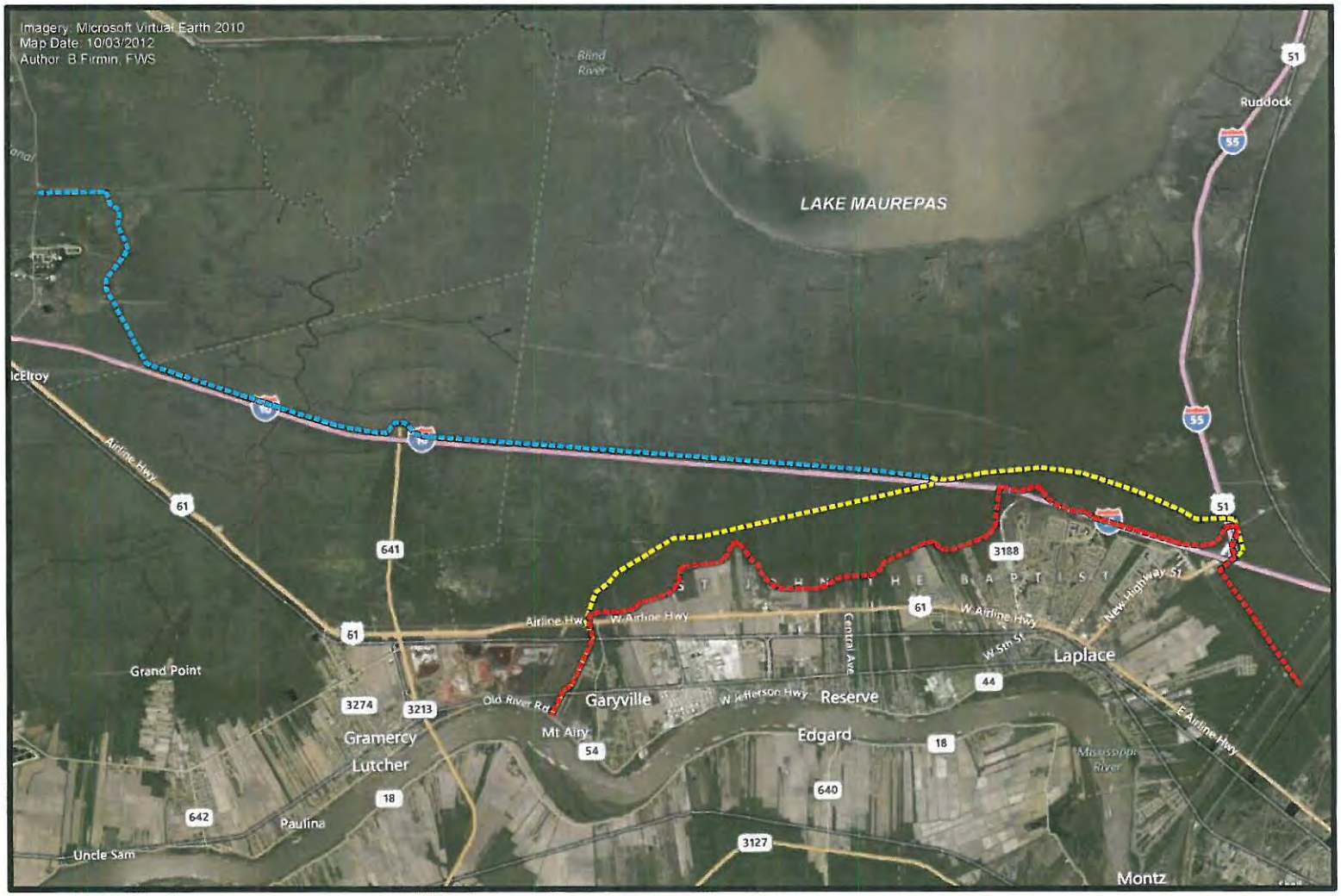
The U.S. Army Corps of Engineers (Corps) is conducting a study; the "West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study" (WSLP) in Ascension, St. Charles, St. James, and St. John the Baptist Parishes, Louisiana, to determine the feasibility of providing Federal hurricane protection to the western shore of Lake Pontchartrain. The study was authorized by resolutions adopted by the U.S. House Committee on Public Works on July 29, 1971, and the U.S. Senate Committee on Public Works September 20, 1974. The Fish and Wildlife Service (Service) has prepared five Planning-aid Reports dated January 21, 1985, June 30, 1987, April 3, 1997, May 4, 2001, and October 9, 2012, for previous reconnaissance studies and one letter for a Notice of Intent dated January 9, 2009. This final report contains a description of existing fish and wildlife resources in the project area, discusses future with-project (FWP) and future without-project (FWOP) habitat conditions, identifies fish and wildlife-related impacts, and provides recommendations to improve the proposed West Shore, Lake Pontchartrain project. This report constitutes the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Service has coordinated with National Marine Fisheries (NMFS) and Louisiana Department of Wildlife and Fisheries (LDWF); their comments have been incorporated into this final report.

The study area is bounded by the Bonnet Carré Spillway to the east, the Mississippi River to the south, Lakes Pontchartrain and Maurepas to the north, and St. James Parish/Ascension Parish line to the west. The communities in this area include Laplace, Reserve, Gramercy, Lutcher, Garyville, Riverland Heights, and Carrollwood. The Louisiana Department of Wildlife and Fisheries (LDWF) manages the Maurepas Swamp Wildlife Management Area (WMA), which contains a majority of the swampland adjacent to and within the project area.

According to an August 2012 map provided by the Corps, there are three preliminary levee alignments which have been identified through previous reconnaissance and feasibility studies that are being considered for the Tentatively Selected Plan (TSP) (Figure 1). Generally, those alignments extend from the west guide levee of the Bonnet Carré Spillway to the vicinity of Hope Canal north of Garyville in St. John the Baptist Parish. Alignment A generally follows the wetland/non-wetland interface from LaPlace to Hope Canal. Alignment C generally follows an existing pipeline corridor north of Alignment A. Alignments A and C both tie into the Mississippi River levee. Alignment D generally follows the Interstate Highway 10 (I-10) corridor and extends outside the original study area into Ascension Parish to tie into an existing non-federal levee.

In the screening of the structural plans the planning team decided that it would not be feasible to extend Alternative A or C into St. James Parish. To address remaining storm surge damages west of Hope Canal non-Structural features have been added to Alternatives A and C. These features include nonstructural berms around the small communities in Gramercy, Grand Point South, and Grand Point North. In addition to the berms north of Highway (Hwy) 3125 the Corps is recommending to use Hwy

Figure 1. Proposed alignments for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study



3125 as a nonstructural feature by providing one-way flapgates on existing culverts to address surge flow through culverts under the highway. The remaining 33 at risk structures will be raised.

Alternative C has been selected as the TSP. Alternative C begins at the West Guide Levee of the Bonnet Carre Spillway and goes west to the United States Highway (US) -51 Interchange where it turns north across US-51 and parallels along a pipeline transmission corridor. At I-10 near the Belle Terre exit, Alternative C crosses the interstate and follows the pipeline corridor through the wetlands until it reaches the St. John/St. James Parish line. At that point the alignment turns southward and extends to the location where the ground elevation is equal to or higher than the levee design crest elevation (near the Mississippi River Levee). This alignment was added to evaluate the feasibility of avoiding multiple pipeline and utility crossings. The nonstructural component was added for areas west of Hope Canal.

The alignment consists largely of earthen levees, but does contain T-walls for crossings of roadways and pipelines. There are also a number of pump stations and environmental control structures associated with the alignment. The total distance of the alignment is estimated at 18.27 miles. There is a need for approximately 3,100,000 cubic yards of earthwork fill, 3,365,000 square yards of geotextile, nearly 26,000 cubic yards of aggregate limestone road, 5,300 linear feet of T-Walls, 300 linear feet of flood gates, 200 linear feet of drainage gates, and 2 railroad gates. There are 4 pumping stations associated with Alignment C. The levee system would primarily be a gravity drainage system with pumps operated only during storm events. With approximately 1.7 storm events per year the gravity drainage would be closed for approximately 8.5 days every year.

DESCRIPTION OF FISH AND WILDLIFE RESOURCE CONDITIONS

The dominant forested habitat types in the study area are bottomland hardwoods and swamp. Vegetation commonly found in these wetland areas includes sugarberry, red maple, sweetgum, American elm, black willow, green ash, overcup oak, Nuttall oak, and American sycamore in the bottomland hardwood habitat and bald cypress, tupelogum, blackgum, lizard's tail, swamp lily, buttonbush, swamp privet, and duckweeds in the swamp habitat. Scattered portions of upland hardwoods, scrub/shrub uplands, and scrub/shrub wetlands also are found along and within the developed areas. Except for Lake Pontchartrain, Lake Maurepas, and the Mississippi River, which border the study area, most of the open water within the study area consists mainly of tidal streams, canals, and ditches. The shallower open water areas may support submerged and/or floating aquatic vegetation such as coontail, pondweeds, naiads, fanwort, water hyacinth, pondweeds, American lotus, and widgeongrass.

Development for residential, commercial, and industrial purposes is located immediately adjacent to U.S. 61 and along the Mississippi River levee. Agriculture, primarily sugarcane production, is also extensive within that portion of the study area. Residential and commercial development is also becoming extensive between U.S. 61 and I-10, as wetlands are drained and/or filled to accommodate growth. Most of U.S. 61 and portions of I-10 are not elevated above the swamps they cross thus impacting the hydrology of those swamps. The wetland complex they cross is part of the largest contiguous wetland area in Louisiana.

The fresh and low-salinity water of the study area supports many commercially and recreationally important fishes such as largemouth bass, black crappie, sunfishes, catfishes, freshwater drum,

buffalos, and gars. The low-salinity waters and wetlands of the study area also provide habitat for many species of estuarine-dependent fishes and shellfishes including southern flounder, sand seatrout, spotted seatrout, Atlantic croaker, striped mullet, Gulf menhaden, blue crab, and white shrimp. Decaying plant material (detritus) is carried by surface runoff and tidal action from the study area wetlands into the adjacent estuarine waters, substantially contributing to the detritus-based food web that supports a high level of estuarine-dependent finfish and shellfish productivity.

The coastal marshes and forested wetlands of the Lake Pontchartrain Basin have been identified by the North American Waterfowl Management Plan (NAWMP), Gulf Coast Joint Venture (GCLV): Mississippi River Coastal Wetlands Initiative as a key waterfowl wintering area. The Gulf Coast is the terminus of the Central and Mississippi Flyways and is therefore one of the most important waterfowl areas in North America, providing both wintering and migration habitat for significant numbers of the continental duck and goose populations that use both flyways. The Mississippi River Coastal Wetlands Initiative area is dominated by coastal marsh, forested swamps, and seasonally flooded bottomland hardwoods that provide habitat for several species of wintering waterfowl. Wood ducks are the primary waterfowl species in forested wetlands, while other ducks (e.g., mallard, American widgeon, gadwall, and lesser scaup) use those forested habitats to a lesser degree. One strategy to achieving the goals and objectives of the GCJV is to maintain the existing functions and values of those habitats and prevent additional losses and degradation of those wetlands (Wilson 2002). Numerous other game birds are present in or adjacent to the study area, including American coot, rails, gallinules, wood duck, common snipe, and American woodcock. Non-game bird species also utilize the study area marshes, including least bittern, pied-billed grebe, black-necked stilt, American avocet, killdeer, black-bellied plover, willet, and various species of sandpipers, gulls, and terns. The study area supports many resident and transient hawks and owls including red-shouldered hawk, barn owl, common screech owl, great horned owl, and barred owl. Winter residents include red-tailed hawk, northern harrier, and American kestrel, while the Mississippi kite, swallow-tailed kite and broad-winged hawk are common summer residents. In addition, the project area supports many species of resident and migratory passerine birds. Some neo-tropical migrants that are currently experiencing a population decline (e.g., white-eyed vireo, northern parula) are dependent on large forested acreage to successfully reproduce. Also, present are cuckoos, swifts, hummingbirds, nighthawks, woodpeckers, and the belted kingfisher.

Important game mammals occurring in the project area include white-tailed deer, eastern cottontail, swamp rabbit, gray squirrel, and fox squirrel. Commercially important furbearers include muskrat, nutria, river otter, raccoon, and mink. Other mammals expected include various species of insectivores, bats, rodents, and the nine-banded armadillo.

Numerous amphibians are expected to occur on stream and lake edges, ponds, and in forested wetlands of the study area including lesser siren, three-toed amphiuma, Gulf Coast toad, eastern narrow-mouthed toad, spring peeper, green treefrog, cricket frog, and bullfrog. Commercially important reptiles found in the streams, canals, and open water areas include American alligator, snapping turtle, alligator snapping turtle, smooth softshell turtle, spring softshell turtle, and diamondback terrapin. Other reptiles commonly found in the project area include red-eared turtle, painted turtle, Mississippi mud turtle, stinkpot, green anole, broad-headed skink, various water snakes, western ribbon snake, speckled kingsnake, and the western cottonmouth.

Threatened and Endangered Species

The Gulf sturgeon (*Acipenser oxyrhynchus desotoi*), federally listed as a threatened species, is an anadromous fish that occurs in many rivers, streams, and estuarine waters along the northern Gulf coast between the Mississippi River and the Suwannee River, Florida. In Louisiana, Gulf sturgeon have been reported at Rigolets Pass, rivers and lakes of the Lake Pontchartrain basin, and adjacent estuarine areas. On March 19, 2003, the Service and the National Marine Fisheries Service (NMFS) published a final rule in the Federal Register (Volume 68, No. 53) designating critical habitat for the Gulf sturgeon in Louisiana, Mississippi, Alabama, and Florida. Portions of the Pearl and Bogue Chitto Rivers, Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, The Rigolets, Lake St. Catherine, and Lake Borgne within Louisiana were included in that designation. While sturgeon have been documented in study area waterways, those waterways are not designated critical habitat.

The pallid sturgeon (*Scaphirhynchus albus*) is an endangered, bottom-oriented, fish that inhabits large river systems from Montana to Louisiana. Within this range, pallid sturgeon tend to select main channel habitats in the Mississippi River and main channel areas with islands or sand bars in the upper Missouri River. In Louisiana it occurs in the Atchafalaya and Mississippi Rivers, and below Lock and Dam Number 3 on the Red River (with known concentrations in the vicinity of the Old River Control Structure Complex.

Entrainment issues associated with dredging operations in the Mississippi and Atchafalaya Rivers and through diversion structures off the Mississippi River are two potential effects that should be addressed in future planning studies and/or in analyzing current project effects. We recommend the following to minimize potential impacts to pallid sturgeon associated with dredging to ensure protection of the pallid sturgeon: (1) the cutterhead should remain completely buried in the bottom material during dredging operations. If pumping water through the cutterhead is necessary to dislodge material or to clean the pumps or cutterhead, etc., the pumping rate should be reduced to the lowest rate possible until the cutterhead is at mid-depth, where the pumping rate can then be increase; (2) during dredging, the pumping rates should be reduced to the slowest speed feasible while the cutterhead is descending to the channel bottom. Should the proposed project directly or indirectly affect the pallid sturgeon or its habitat, further consultation with this office will be necessary.

Federally listed as an endangered species, West Indian manatees (*Trichechus manatus*) occasionally enter Lakes Pontchartrain and Maurepas, and associated coastal waters and streams during the summer months (i.e., June through September). Manatee occurrences appear to be increasing, and they have been regularly reported in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, and in canals within the adjacent coastal marshes of Louisiana. They have also been occasionally observed elsewhere along the Louisiana Gulf coast. Should the proposed project involve activity in the aquatic environment in those areas during summer months, further consultation with this office will be necessary.

Candidate Species

The Sprague's pipit (*Anthus spragueii*), is a candidate species for federal listing as a threatened or endangered species. Candidate species are those taxa for which the Service has on file sufficient information regarding biological vulnerability and threat(s) to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions. Sprague's pipit is a small (4 to 6 inches in length) passerine bird with a plain buffy face, a large eye-ring, and buff and blackish streaking on the crown, nape, and under parts. It winters in Louisiana, arriving from its northern breeding grounds in September and remaining until April. Migration and wintering ecology of this species is poorly known, but Sprague's pipit exhibits a strong preference for open grassland (i.e., native prairie) with native grasses of intermediate height and thickness, and it avoids areas with too much shrub encroachment. Its use of an area is dependent upon habitat conditions. This species is a ground feeder and forages mainly on insects but will occasionally eat seeds.

There is currently no requirement under the Endangered Species Act for consultation regarding project impacts on candidate species. In the interest of conserving the Sprague's pipit, we encourage you to avoid project activities that would adversely affect this species or its habitat. Should it be federally listed as threatened or endangered in the future, however, further consultation on project impacts to this species could then be necessary.

Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA)

The proposed project area forested wetlands may provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which was officially removed from the List of Endangered and Threatened Species as of August 8, 2007. However, the bald eagle remains protected under the MBTA and BGEPA. There are approximately 28 known bald eagle nests in the study area. Comprehensive bald eagle survey data have not been collected by the Louisiana Department of Wildlife and Fisheries (LDWF) since 2008, and new active, inactive, or alternate nests may have been constructed within the proposed project area since that time. Bald eagles typically nest in large trees located near coastlines, rivers, or lakes that support adequate foraging from October through mid-May. In southeastern Louisiana parishes, eagles typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water. During any project construction, on-site personnel should be informed of the possible presence of nesting bald eagles in the vicinity of the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest occurs or is discovered within 1,500 feet of the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary.

The proposed project would be located in an area where colonial nesting waterbirds may be present in the project area as well as borrow area, specifically the Bonnet Carre borrow site. There are approximately 6 known nesting bird colonies in the study area. Colonies may be present that are not currently listed in the database maintained by LDWF. That database is updated primarily by monitoring the colony sites that were previously surveyed during the 1980s. Until a new,

comprehensive coast-wide survey is conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season. To minimize disturbance to colonial containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present). In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season.

Managed Areas and Restoration Projects

The LDWF operates the Maurepas Swamp WMAs which encompasses over 100,000 acres of wetlands in and around the study area. Unavoidable direct and indirect impacts to the Maurepas Swamp WMA should be mitigated for on the WMA. In addition, the Maurepas Swamp WMA could be considered for mitigation of unavoidable impacts to other swamp areas. Please contact the LDWF, Region 7 Office (225/765-2360), for further information regarding any additional permits that may be required to perform work on that WMA.

In addition, two federally approved wetland mitigation banks are located within the study area including the Sawgrass Bayou Mitigation Area owned by Blind River Properties (Mr. Dale Martin, 225/698-2700), and Lake Maurepas Mitigation Area owned by Stream Properties, LLC (Mr. Jeff Peterson, 337/433-1055, ext. 20). If the proposed project entails work within or adjacent to those bank sites, or if an alternative could potentially alter the hydrology of those sites, then the bank sponsors and the mitigation interagency review team should be contacted.

There is one Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) project, River Reintroduction into Maurepas Swamp (PO-29) currently in Phase I in the study area. Any potential impacts to this CWPPRA project would need to be addressed.

Subsidence, sea level rise, and hydrologic modifications coupled with the isolation of project area wetlands from the natural overflow of the Mississippi River that formerly sustained these wetlands, has begun to lead to the long-term degradation of the quality and quantity of project area wetlands. Projects such as the above CWPPRA have the goal of restoring some of the natural overflow processes.

EVALUATION METHODOLOGY

To expedite the planning process, and be consistent with the new Corps SMART Planning Procedures, impacts were preliminarily determined utilizing existing information about the project area from the Coastwide Reference Monitoring System (CRMS) as a surrogate for habitat quality. Once a TSP was chosen, a feasibility-level habitat analysis using Wetland Value Assessment (WVA) methodology was conducted on the TSP. The detailed habitat analysis information was then used to analyze and compare previous alternatives to confirm the correct plan was selected.

To quantify anticipated project impacts to fish and wildlife resources, the Service used the WVA methodology. The WVA was developed to evaluate restoration projects proposed for the Coastal Wetlands Planning, Protection and Restoration Act and was modified through the Corps Certification Process for appropriateness of use in the Corps planning process.

In the WVA methodology, habitat units fluctuate in response to changes in habitat quality, represented by the Habitat Suitability Index (HSI), and/or quantity (acres); those changes are predicted for various target years over the project life (i.e., 50 years), for future without-project and future with-project scenarios. Target years (TY) were selected for this analysis to capture the effects of important biological events. For all the habitat assessments, the products of the resulting HSI values and acreage estimates were then summed and annualized for each habitat type to determine the Average Annual Habitat Units (AAHUs) available. The net change (increase or decrease) in AAHUs under future with-project conditions, compared to future without-project conditions, provides a quantitative comparison of anticipated project impact/benefits in AAHUs. Further explanation of how impacts/benefits are assessed with WVA and an explanation of the assumptions affecting HSI values for each target year are available for review at the Fish and Wildlife Service's (Service) Lafayette, Louisiana, field office.

PROJECT IMPACTS

Construction of Alternative C will result in the direct loss of approximately 1,236 acres (-691 AAHUs) of swamp and bottomland hardwoods (BLH) and encloses 8,521 acres (-498 AAHUs) of valuable swamp habitat for a total of 9,757 acres (-1189 AAHUs) of direct and indirect acres (Table 1). Although Alternative C has a greatly reduced the number of total impacted acres compared to Alternative D (57,343 acres) it is still significantly greater than Alternative A (3,941 acres).

Alternative C will provide levee protection for Laplace, Reserve, Garyville and nonstructural protection west of Hope Canal. This alternative is the second least environmentally damaging alternative while providing protection to the same communities in the study area. With Alternative C there will be some impacts to the Maurepas Swamp WMA and potentially some impacts to the CWPPRA River Reintroduction into Maurepas Swamp (PO-29) project. However, Alternative C avoids a myriad of pipeline and utility crossings and is expected provide additional storm water storage capacity for exceedence events (i.e. where a storm event is greater than the design elevation of the levee and overtopping or levee failure results) in the enclosed wetland area thus decreasing the potential of flooding nearby developed areas.

Table 1. West Shore Lake Pontchartrain Acres Summary of Unavoidable Direct and Indirect Impacts for Intermediate Relative Sea Level Rise.

WVA titles/groupings		Initial Acres	AAHUs
Direct swamp	East	253	-142.2
	Central	540	-288.4
	West	319	-164.8
Total Direct Swamp		**1112**	**-595.3**
Indirect Swamp	East	2325	-110.6
	Central	4383	-322.9
	West	1724	-60.9
Total Indirect Swamp		**8432**	**-494.5**
Direct BLH		123	-95.5
Indirect BLH with impacts		89	-3.1
Non-Structural Direct Swamp		1	-0.3
	TOTAL	**9757**	**-1188.7**

Note: Totals may be slightly off due to automatic rounding of spreadsheets.

Hydrologic modeling indicates that the project design would have minimal changes to tidal flows or stages to protected-side swamps. To accomplish this, culverts would be included within the levee system in order to retain hydrologic connectivity between the protected and unprotected areas. All locations with pump stations or drainage structures will be connected to a flood side ditch and a protected side canal that will parallel the entire levee. The canal will be used to maintain existing connection between swamps located both inside and outside of the levee system. The protected side canal will also serve as a redundancy connection if one of the pump stations failed during a flood event.

Based on the 2008 to 2012 water level range data for the CRMS stations CRMS0059 and CRMS5373 the swamps are seasonally flooded in the west and semi-permanently flooded in the central and eastern portion of the project area (Louisiana Office of Coastal Protection and Restoration, 2013). The wetlands of the study area that will be enclosed by the proposed levee alignment have moderate to low water flow/exchange due to the many berms (e.g., U.S. 61 and I-10) scattered throughout the area. Maintaining flow/exchange may be possible if there are enough openings for water exchange. However delays (resulting in more standing water) in water movement are expected as well as an elimination of overbank flows on existing interior berms.

In addition to the potential impact to water exchange in the protected-side swamp, the Service is concerned about reduced future water exchange due to Sea Level Rise (SLR) requiring increased structure closures. For the purposes of this project, the habitat evaluation team (HET) assumed the trigger for structure closures would be tropical storm events and the elevation trigger would be adjusted as sea level rises. Therefore, the project sponsor would not close the system more often due to higher day-to-day sea level rise impacts. However, there is concern for potential reduced future water exchange due to relative SLR (RSLR) requiring increased structure closures. The

frequency and duration of gate closures is expected to increase due to area-wide stage increases caused by RSLR thereby, leading to potential substantial affects to wetlands enclosed by the levee system. The HET agreed that if the sponsor/operator sees a higher level of sea level rise and starts to see increased soil saturation/flooding in developed areas, they may want to change the operations to close the structures during high tides. A change in operations would be considered a separate project purpose and authorization (i.e., not storm related flooding), and would require new National Environmental Policy Act (NEPA) documentation or a permit approval. If a change in operation due to RSLR is realized, it is currently unknown how water levels within the system would be managed but there is a potential for substantial additional indirect impacts to swamp and fish and wildlife resources to occur. These additional impacts would need to be evaluated and mitigated via future NEPA documentation.

If the proposed levee and/or operation of structures increases flood frequency and water depth the bald cypress swamp will become stressed which could result in a reduction in diversity and productivity (Krauss et. al. 2009). Increased water depth can also reduce the transfer of oxygen to roots. Over time, a stressed swamp could convert to marsh and/or open water. Reduced water exchange in the enclosed wetlands would lead to further water quality deterioration in the Lake Pontchartrain Basin by eliminating or reducing the filtering capacity of those wetlands. The potential wetland habitat impact to the largest remaining continuous forested wetlands in Louisiana would result in the reduction of resident fish and wildlife, reduced important wintering habitat for waterfowl and other migratory birds that use the Central and Mississippi Flyways, and reduced nursery habitat and detritus input important to the maintenance of estuarine-dependent fish and shellfish production

There will be approximately 205 acres of direct impact and 241 acres of indirect impacts made to the Maurepas Swamp WMA, which is equivalent to -123 AAHUs (Table 2). Impacts to the WMA should be mitigated for on WMA lands and specifically the indirect hydrologic impacts should be remediated with hydrologic improvements on the WMA as well as replacement of lost swamp.

Table 2. Unavoidable Direct and Indirect Impacts to the Maurepas Swamp Wildlife Management Area Determined Under Intermediate Relative Sea Level Rise.

	East		Central		West		TOTAL	Total
	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	acres	AAHUS
Direct	110.56	-62.1	70.99	-37.9	23.08	-11.9	204.6	-112.0
Indirect	160.51	-7.6	11	-0.8	69.68	-2.5	241.2	-10.9
TOTAL	271.07	-69.8	81.99	-38.7	92.76	-14.4	445.8	-122.9

Note: Totals may be slightly off due to automatic rounding of spreadsheets.

Developmental pressures on enclosed forested wetlands would likely increase with levee construction due to the reduced threat of flooding in the area but that would also be dependent on the proposed operation of pumps. According to the Corps Civil Works Program Five-Year Development Plan for Fiscal Year 2011 to Fiscal Year 2015, national flood damages are increasing and that is attributed to population migration to the coasts and development of floodplains, thus creating apparent contradiction between flood damage reduction investments and national flood damages (Corps of Engineers, 2011). Induced development of the protected-side wetlands would not be conducive with the Corps' plan to reduce flood damages and also utilize this area for flood

storage capacity during storms exceeding the project design. Another apparent inconsistency between programs is the planning of restoration projects while at the same time levees are being proposed to enclose floodplain habitat and permits are issued for development in these floodplains. More consistency between these programs needs to address the conflicting approaches between restoration and future development. Therefore, the Corps and local sponsor should acquire adequate protection of the enclosed wetlands to ensure and maintain preservation of those areas in perpetuity via the purchase of non-development easements and local flood zoning ordinances.

It is expected that three potential borrow sources will be used for this project: the Bonnet Carre borrow area located north of Airline Highway in St. Charles Parish, Louisiana; the Big Shake borrow site located in St. James Parish, a 441-acre actively-farmed sugarcane fields between LA-44 and LA-3125 in a rural area; and the River Bend II borrow site located at LaPlace, St. John the Baptist Parish which is currently used for sugarcane farming and has 7.39 acres of non-wetland bottomland hardwood (BLH) habitat located within the proposed site. All three sites have environmental clearance via environmental documentation. The Bonnet Carre site was documented in the 2007 "Final Phase I Environmental Site Assessment, Bonnet Carre Borrow Area, North of Airline Highway, St. Charles Parish, Louisiana." The Big Shake site is documented in the Greater New Orleans Hurricane and Storm Damage Risk Reduction System (HSDRRS) Individual Environmental Report (IER) 30 Decision Record dated September 2009. The River Bend II site is documented in the HSDRRS IER 35 Decision Record dated October 2011. If the proposed project needs more borrow than the already environmentally cleared borrow sites please consider that the Corps has almost completed full implementation of the newly-authorized protection levels for hurricane and flood protection projects in the Greater New Orleans area. The combined need for borrow necessary to complete authorized flood protection improvements and construction of other proposed and implemented Federal and non-Federal hurricane and flood protection levees may have diminished local availability. The search for levee-building material has been typically conducted on a project-by-project basis, and has led to the least-expensive and easiest sources for borrows material, which is usually located within wetlands and/or bottomland hardwoods adjacent to the proposed levee. Use of such on-site sources often has adverse impacts on wetlands and is frequently inconsistent with coastal restoration efforts. Use of those sites will be counterproductive with respect to minimizing wetland impacts and attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem. The Service's priority selection process for borrow material outlined in our August 7, 2006, letter to the Corps regarding the Greater New Orleans Hurricane and Storm Damage Risk Reduction project should be utilized (Appendix A). The Service recommends further investigation of the identified potential borrow areas (map provided via a March 2013 email) that are likely to have minimal impacts to fish and wildlife areas identified on that map should be investigated first as potential borrow sources.

SERVICE POSITION AND RECOMMENDATIONS

The Service would prefer to see selection of the least environmentally damaging alterative which is Alternative A. However, we recognize and understand the logic and reasoning for selecting Alternative C, which includes avoidance of the costly relocation of pipelines and utilities and is expected to provide additional storm water storage capacity for exceedence events thus decreasing the flooding potential of nearby developed areas. Construction of Alternative C will result in the direct loss of approximately 1,236 acres (-691 AAHUs) of swamp and BLH and encloses 8,521 acres (-498 AAHUs) of valuable swamp habitat for a total of 9,757 acres (-1189 AAHUs) of direct and indirect acres.

The Service's Mitigation Policy (Federal Register, Volume 46, No. 15, January 23, 1981) identifies four resource categories that are used to ensure that the level of mitigation recommended by Service biologists will be consistent with the fish and wildlife resource values involved. Considering the high value of forested wetlands for fish and wildlife and the relative scarcity of that habitat type on a basin-wide scale, that habitat type is designated as Resource Category 2, the mitigation goal for which is no net loss of in-kind habitat value.

For those features that undergo additional design work during the Pre-construction Engineering and Design phase (PED) the Corps should coordinate that work with the Service and other natural resource agencies in accordance with the FWCA. Funding for such work may also be necessary.

We appreciate the Corps' consideration of our recommendations below for the WSLP project. Provided that the below recommendations are included and adequately addressed in the final feasibility report and pending our review of the adaptive management component of the mitigation plan and resolution of any additional recommendations, the Service does not oppose implementation of the TSP.

The Service respectfully requests the following recommendations are implemented concurrently with project implementation:

1. The Service and LDWF recommend that the unavoidable direct and indirect (including hydrologic) impacts (approximately 446 acres and -123 AAHUs of total WMA impacts) to the wetlands within the Maurepas Swamp WMA be mitigated on the WMA lands, specifically by making hydrologic improvements as well as replacement of lost swamp.
    a. In the Corps' Blind River Swamp Restoration Project (SWAMP2) mitigation plan it states that the Corps intends to "Verify that the Livingston Parish Coastal Impact Assistance Program (CIAP) project was built, and that those hydraulic modifications when combined with this planting plan will produce the proposed AAHUs." The Service and LDWF recommend the Corps state that if the hydraulic modifications are not made (or only partially made) as part of the proposed CIAP project that the SWAMP2 mitigation will include the hydraulic modifications as a project feature with detailed engineering, adaptive management and monitoring to be developed during the PED phase. The Service and LDWF recognize that since this feature may

not be part of the mitigation plan, adaptive management and monitoring plans do not need to be developed at this time.

b. We recommend that the Corps continue coordination on the proposed mitigation with LDWF and the Service throughout further development and design.

2. Over 8,000 acres of swamp will be enclosed within the levee of Alternative C. The proposed alternative may alter natural periods of inundation or soil saturation in the impounded wetlands and could prove detrimental to their function and longevity. Therefore, the Service recommends;
    a. That because of our concern about the limited number of proposed culvert openings not being adequate to maintain existing water exchange in regard to water depth, delays in water movement, and impacts to water quality; the Corps undertake, if necessary, the installation of additional culverts and/or water control structures in the levee to ensure adequate water exchange while maintaining that all structures should be closed only in advance of tropical storms.
    b. That hydrologic gauges be placed and maintained in appropriate locations to assist in determining future impacts to enclosed swamps. These gauges could be supported or cost-shared through existing activities such as through the US Geological Survey (USGS) or CRMS.
    c. To aid in water quality improvements, any pumping stations associated with the project should not discharge directly into canals or other open water bodies, but rather into wetland systems that can assimilate nutrients being discharged.

3. Operational plans for floodgates and water control structures should be developed to maximize the open cross-sectional area for as long as possible. Development of water control structure operation manuals or plans should be done in coordination with the Service and other natural resource agencies.

4. The trigger for structure closures would be tropical storm events. Therefore, the project would not close the system more often due to higher day-to-day sea level rise impacts. If the sponsor/operator sees a higher level of sea level rise and starts to see increased soil saturation/flooding in developed areas, they may want to change the operations to close the structures at high tides. A change in operations would be considered a separate project purpose and authorization and would require a new NEPA documentation and/or a permit approval for this operation change. If a change in operation due to RSLR is realized, it is unknown at present, how water levels within the system would be managed so there is a potential for substantial additional indirect impacts to swamp and fish and wildlife resources to occur. If the system is closed more often due to higher RSLR impacts, the Service recommends additional impacts be evaluated and mitigated.

5. The Service recommends preservation of enclosed wetlands be ensured (in perpetuity) via the purchase of non-development easements and local flood zoning ordinances. Providing perpetual preservation of enclosed wetlands would also guarantee flood storage areas within the levee system.
    a. If the Corps declares the enclosed wetlands will be used as a flood storage area, the Service recommends that the Corps determine and designate the flood storage area

within the levee system that the nonfederal sponsor will be responsible for maintaining.

6. Alternative C could potentially have impacts to the CWPPRA River Reintroduction into Maurepas Swamp (PO-29) project. The Service recommends close coordination with the planning objectives and planning team of that restoration project and that any potential impacts to this CWPPRA project be addressed.

7. If it becomes necessary to use borrow sources other than the previously proposed environmentally cleared sites, the Service recommends investigating potential borrow sources based on the map identifying potential borrow areas that are likely to have minimal impacts to fish and wildlife resources that we provided, via a September 9, 2008, letter and based on our priority selection process for borrow material outlined in our August 7, 2006, letter to the Corps regarding the Greater New Orleans Hurricane and Storm Damage Risk Reduction project (Appendix A) should be utilized (please contact Cathy Breaux (504)862-2689 or David Walther (337)291-3122 for more information).

8. The enclosure of wetlands within the proposed levee is necessary to avoid pipeline and utility relocations and to provide for floodwater storage. Full, in-kind compensation (quantified as Average Annual Habitat Units) is recommended for unavoidable direct (levee footprint) adverse impacts and indirect habitat value losses (enclosed wetlands) on forested wetlands associated with levee construction. To help ensure that the proposed mitigation features meet their goals, the Service provides the following recommendations.
    a. If applicable, a General Plan should be developed by the Corps, LDWF, and the Service in accordance with Section 3(b) of the Fish and Wildlife Coordination Act for mitigation lands.
    b. Continued mitigation planning should be closely coordinated with the Service, LDWF, and other interested natural resource agencies and should include any additional losses identified during future engineering and design studies.
    c. Mitigation measures should be constructed concurrently with the flood damage reduction features that they are mitigating (i.e., mitigation construction should be initiated no later than 18 months after levee construction has begun). Completion of mitigation means that interim success criteria have been achieved.
    d. If mitigation is not implemented concurrent with levee construction, the amount of mitigation needed should be reassessed and adjusted to offset temporal losses of wetlands.
    e. The Corps should remain responsible for the required mitigation until the mitigation is demonstrated to be fully compliant with interim success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and dike gapping criteria.
    f. The acreage restored and/or managed for mitigation purposes, and adjacent affected wetlands, should be monitored over the project life. This monitoring should be used to evaluate project impacts, the effectiveness of the compensatory mitigation measures, and the need for additional mitigation should those measures prove insufficient.

9. The Service recommends enough money be set aside for adaptive management to address potential impacts of the enclosed wetlands. The Service, LDWF, and other natural resource agencies should be consulted in the development of plans and specifications for all mitigation features and any monitoring and/or adaptive management plans. In addition, the Service recommends the Monitoring and Adaptive Management Plan, as it is further developed, be provided to the Service, NMFS, and LDWF for review, comment, and input.

10. Alignment C will occur partly within the boundaries of Maurepas Swamp WMA. Please coordinate all activities within the WMA with LDWF. Please contact Mr. Christian Winslow (985-543-4781 or cwinslow@wlf.la.gov) and Mr. Mike Windham at 504-284-5268 or cwindham@wlf.la.gov for more information about appropriate WMA authorizations.

11. Blind River is a Louisiana designated Natural and Scenic River. The Corps must obtain authorization from the LDWF, Scenic Rivers Program prior to initiating any of the proposed activities within or adjacent to the banks of Blind River. Scenic Rivers Coordinator Keith Cascio can be contacted at (318) 343-4045 or kcascio@wlf.la.gov.

12. The Corps should coordinate closely with the Service, LDWF, and other fish and wildlife conservation agencies throughout the pre-construction engineering and design phase of project features including levees, floodgates, environmental water control structures, and operation plans to ensure that those features are designed, constructed and operated consistent with wetland restoration purposes and associated fish and wildlife resource needs, and to update and finalize impacts and to develop an adequate mitigation plan.

13. West Indian manatees (*Trichechus manatus*) occasionally enter Lakes Pontchartrain and Maurepas, and associated coastal waters and streams during the summer months (i.e., June through September). During in-water work in areas that potentially support manatees all personnel associated with the project should be instructed about the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Additionally, personnel should be instructed not to attempt to feed or otherwise interact with the animal, although passively taking pictures or video would be acceptable. For more detail on avoiding contact with manatee contact this office. Should a proposed action directly or indirectly affect the West Indian manatee, further consultation with this office will be necessary.

14. Avoid adverse impacts to nesting bald eagles and wading bird colonies through careful design project features and timing of construction. The Service and LDWF recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies and bald eagles during the nesting season (i.e., September 1 through February 15 for wading bird nesting colonies and October through mid-May for bald eagles).

15. If proposed project features, including adaptive management features, are changed significantly or are not implemented within one year of the Endangered Species Act consultation letter, we recommend that the Corps reinitiate coordination with the Service and NMFS to ensure that the proposed project would not adversely affect any federally listed threatened or endangered species or their critical habitat.

16. Costs and tasks associated with the Service's involvement in future planning and construction phases should be coordinated with the Service prior to the finalization of the project management plan or similar documents (e.g., decision management plan).

Should you or your staff have any questions, or if you would like to meet with us regarding the content of this report, please contact Mrs. Catherine Breaux (504/862-2689) of this office.

LITERATURE CITED

Cretini, K.F., Visser, J.M., Krauss, K.W., and Steyer, G.D. (2012). Development and use of floristic quality index for coastal Louisiana marshes. Environmental Monitoring and Assessment 184:2389-2403.

Department of the Army, U.S. Army Corps of Engineers Civil Works Program Five-Year Development Plan for Fiscal Year 2011 to Fiscal Year 2015, 145 pages. http://www.usace.army.mil/Portals/2/docs/civilworks/5yr_devplan/fy11_5yrplan.pdf

Krauss, K.W., Duberstein, J.A., Doyle, T.W., Conner, W.H., Day, R.H., Inabinette, L.W., and Whitbeck J.L., 2009. Site Condition, Structure, and Growth of Baldcypress Along Tidal/Non-Tidal Salinity Gradients. Wetlands, Vol. 29, No. 2, June 2009, pp. 505–519.

Snedden, G.A., and Swenson, E.M., 2012, Hydrologic index development and application to selected Coastwide Reference Monitoring System sites and Coastal Wetlands Planning, Protection and Restoration Act projects: U.S. Geological Survey Open-File Report 2012–1122, 25 p.

Louisiana Office of Coastal Protection and Restoration. 2013. Coastwide Reference Monitoring System-Wetlands Monitoring Data. Retrieved from Strategic Online Natural Resource Information System (SONRIS) database. http://coastal.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=92 Accessed 09 May 2013.

Wilson, B.C., C.A. Manlove, and C.G. Esslinger. 2002. North American Waterfowl Management Plan, Gulf Coast Joint Venture: Mississippi River Coastal Wetlands Initiative. North American Waterfowl Management Plan, Albuquerque, NM. 28 pp. + appendix.

Appendix A

The Service's priority selection process for borrow material as outlined in our August 7, 2006, letter to the Corps

This information is provided in accordance with the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), Fish and Wildlife Coordination Act (FWCA, 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and the Migratory Bird Treaty Act (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.).

Through the efforts of Task Force Guardian, the Corps restored Hurricane Katrina-damaged hurricane/flood protection projects to their authorized or previously permitted/constructed protection levels. Identification of borrow areas needed to complete those repairs utilized a protocol that prioritized selection of those sites in the following order: existing commercial pits, upland sources, previously disturbed/manipulated wetlands within a levee system, and low-quality wetlands outside a levee system. The Service supports the use of such protocols to avoid and minimize impacts to wetlands and bottomland hardwoods within project areas. Avoidance and minimization of those impacts helps to provide consistency with restoration strategies and compliments the authorized hurricane protection efforts. Such consistency is also required by Section 303(d)(1) of the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA).

Accordingly, the Service recommends that prior to utilizing borrow sites every effort should be made to reduce impacts by using sheetpile, floodwalls or deep soil mixing to decrease levee widths wherever feasible. In addition, the Service recommends that the following protocol be adopted and utilized to identify borrow sources in descending order of priority:

1. Permitted commercial sources, authorized borrow sources for which environmental clearance and mitigation have been completed, or non-functional levees after newly constructed adjacent levees are providing equal protection.

2. Areas under forced drainage that are protected from flooding by levees, and that are:

   a) non-forested (e.g., pastures, fallow fields, abandoned orchards, former urban areas) and non-wetlands;

   b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands (e.g., wet pastures), excluding marshes;

   c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).

3. Sites that are outside a forced drainage system and levees, and that are:

   a) non-forested (e.g., pastures fallow fields, abandoned orchards, former urban areas) and non-wetlands;

b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands (e.g., wet pastures), excluding marshes;

c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).

Notwithstanding this protocol, the location, size and configuration of borrow sites within the landscape is also critically important. Coastal ridges, natural levee flanks and other geographic features that provide forested/wetland habitats and/or potential barriers to hurricane surges should not be utilized as borrow sources, especially where such uses would diminish the natural functions and values of those landscape features.

To assist in expediting the identification of borrow sites, the Service recommends that immediately after the initial identification of a new borrow site the Corps should initiate informal consultation with the Service regarding potential impacts to federally listed threatened or endangered species. To aid you in complying with those proactive consultation responsibilities, the Service has enclosed a list of threatened and endangered species and their critical habitats within the coastal parishes of the New Orleans District.

The Service offers the following additional recommendations for reducing borrow site impacts on fish and wildlife resources and, where feasible, enhancing those resources. However, these additional recommendations should not be implemented if they would result in the expansion of existing borrow pits or construction of new borrow pits in wetlands or bottomland hardwoods.

1. A minimum of 30 percent of the borrow pits edge should slope no greater than 5 horizontal (H):1 vertical (V), starting from the water line down to a depth of approximately 5 feet.

2. Most of the woody vegetation removed during clearing and grubbing should be placed into the deepest parts of the borrow pits and the remaining debris should be placed in the water along the borrow pit shorelines, excluding those areas where the 5H:1V slope, per recommendation 1, have been constructed.

3. Following construction, perimeter levees (if constructed) around each borrow pit should be gapped at 25-foot intervals with an 8-foot-wide breach, the bottom elevation of which should be level with the adjacent natural ground elevation.

When avoidance and minimization of bottomland hardwood and wetland impacts is not practicable, all unavoidable net losses of those habitats should be fully offset via compensatory mitigation. Such compensatory mitigation should be sited within the watershed and/or hydrologic unit where the impact occurred, and should be completed concurrently with borrow operations, or as soon thereafter as possible.

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex H

U.S. Fish and Wildlife Service Scoping / Planning Aid Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

January 9, 2009

Colonel Alvin B. Lee
District Engineer
Attention: Mr. Bill Klein, CEMVN-PM-RS
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Lee:

The U.S. Fish and Wildlife Service (Service) has reviewed the Department of the Army, Corps of Engineers (Corps), Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement (DEIS) for the West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study. The NOI was published in the Federal Register (Volume 73, No. 235, pg. 74150) on December 5, 2008 (Department of Interior No. ER86/1259). The study was authorized by resolutions adopted by the House Committee on Public Works on July 29, 1971, and the Senate Committee on Public Works September 20, 1974. The Fish and Wildlife Service has prepared three Planning-aid Reports dated January 21, 1985, June 30, 1987, and April 3, 1997, for previous reconnaissance studies on this proposed project. The Service submits the following comments in accordance with the National Environmental Policy Act of 1969 (83 Stat. 852, as amended; 42 U.S.C. 4321 et seq.), the Migratory Bird Treaty Act (MBTA, 40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The Corps is conducting a study to determine the feasibility of providing Federal hurricane protection to the western shore of Lake Pontchartrain. Four preliminary levee alignments have been identified through previous reconnaissance and feasibility studies. Generally, those alignments extend from the west guide levee of the Bonnet Carré Spillway to the vicinity of Hope Canal north of Garyville in St. John the Baptist Parish, with one alternative alignment extending into Ascension Parish to tie into an existing non-federal levee. The study area is bounded by the Bonnet Carré Spillway to the east, the Mississippi River to the south, Lakes Pontchartrain and Maurepas to the north, and St. James Parish/Ascension Parish line to the west.

DESCRIPTION OF FISH AND WILDLIFE RESOURCE CONDTIONS

TAKE PRIDE® IN AMERICA

DESCRIPTION OF FISH AND WILDLIFE RESOURCE CONDTIONS

The dominant forested habitat types in the study area are bottomland hardwoods and swamp. Vegetation commonly found in these wetland areas includes sugarberry, red maple, sweetgum, American elm, black willow, green ash, overcup oak, Nuttall oak, and American sycamore in the bottomland hardwood habitat and baldcypress, tupelogum, blackgum, lizard's tail, swamp lily, buttonbush, swamp privet, and duckweeds in the swamp habitat. Scattered portions of upland hardwoods, scrub/shrub uplands, and scrub/shrub wetlands also are found along and within the developed areas. Except for Lake Pontchartrain, Lake Maurepas, and the Mississippi River, which border the study area, most of the open water within the study area consists mainly of tidal streams, canals, and ditches. The shallower open water areas may support submerged and/or floating aquatic vegetation such as coontail, pondweeds, naiads, fanwort, water hyacinth, pondweeds, American lotus, and widgeongrass.

Development for residential, commercial, and industrial purposes is located immediately adjacent to U.S. 61 and along the Mississippi River levee. Agriculture, primarily sugarcane production, is also extensive within that portion of the study area. Residential and commercial development is also becoming extensive between U.S. 61 and I-10, as wetlands are drained and/or filled to accommodate growth.

The fresh and low-salinity water of the study area supports many commercially and recreationally important fishes and shellfishes such as largemouth bass, black crappie, sunfishes, catfishes, freshwater drum, buffalos, and gars. The low-salinity waters and wetlands of the study area also provide habitat for many species of estuarine-dependent fishes and shellfishes including southern flounder, sand seatrout, spotted seatrout, Atlantic croaker, striped mullet, Gulf menhaden, blue crab, and white shrimp. Decaying plant material (detritus) is carried by surface runoff and tidal action from the study area wetlands into the adjacent estuarine waters, substantially contributing to the detritus-based food web that supports a high level of estuarine-dependent finfish and shellfish productivity.

The coastal marshes and forested wetlands of the Lake Pontchartrain Basin have been identified by the North American Waterfowl Management Plan (NAWMP), Gulf Coast Joint Venture (GCLV): Mississippi River Coastal Wetlands Initiative as a key waterfowl wintering area. The Gulf Coast is the terminus of the Central and Mississippi Flyways and is therefore one of the most important waterfowl areas in North America, providing both wintering and migration habitat for significant numbers of the continental duck and goose populations that use both flyways. The Mississippi River Coastal Wetlands Initiative area is dominated by coastal marsh, forested swamps, and seasonally flooded bottomland hardwoods that provide habitat for several species of wintering waterfowl. Wood ducks are the primary waterfowl species in these forested wetlands, while other ducks (e.g., mallard, American widgeon, gadwall, and lesser scaup) use these habitats to a lesser degree. One strategy to achieving the goals and objectives of the GCJV is to maintain the existing functions and values of those habitats and prevent additional losses and degradation of those wetlands (Wilson 2002). Numerous other game birds are present in or adjacent to the study area, including American coot, rails, gallinules, wood duck, common snipe, and American woodcock. Non-game bird species also utilize the study area marshes, including

least bittern, pied-billed grebe, black-necked stilt, American avocet, killdeer, black-bellied plover, willet, and various species of sandpipers, gulls, and terns. The study area supports many resident and transient hawks and owls including red-shouldered hawk, barn owl, common screech owl, great horned owl, and barred owl. Winter residents include red-tailed hawk, northern harrier, and American kestrel, while the Mississippi kite, swallow-tailed kite and broad-winged hawk are common summer residents. In addition, the project area supports many species of resident and migratory passerine birds. Some neo-tropical migrants that are currently experiencing a population decline (e.g., white-eyed vireo, northern parula) are dependent on large forested acreage to successfully reproduce. Also, present are cuckoos, swifts, hummingbirds, nighthawks, woodpeckers, and the belted kingfisher.

Important game mammals occurring in the project area include white-tailed deer, eastern cottontail, swamp rabbit, gray squirrel, and fox squirrel. Commercially important furbearers include muskrat, nutria, river otter, raccoon, and mink. Other mammals expected include various species of insectivores, bats, rodents, and the nine-banded armadillo.

Numerous amphibians are expected to occur on stream and lake edges, ponds, and in forested wetlands of the study area including lesser siren, three-toed amphiuma, Gulf Coast toad, eastern narrow-mouthed toad, spring peeper, green treefrog, cricket frog, and bullfrog. Commercially important reptiles found in the streams, canals, and open water areas include American alligator, snapping turtle, alligator snapping turtle, smooth softshell turtle, spring softshell turtle, and diamondback terrapin. Other reptiles commonly found in the project area include red-eared turtle, painted turtle, Mississippi mud turtle, stinkpot, green anole, broad-headed skink, various water snakes, western ribbon snake, speckled kingsnake, and the western cottonmouth.

Threatened and Endangered Species

The Gulf sturgeon (Acipenser oxyrhynchus desotoi), federally listed as a threatened species, is an anadromous fish that occurs in many rivers, streams, and estuarine waters along the northern Gulf coast between the Mississippi River and the Suwannee River, Florida. In Louisiana, Gulf sturgeon have been reported at Rigolets Pass, rivers and lakes of the Lake Pontchartrain basin, and adjacent estuarine areas. Spawning occurs in coastal rivers between late winter and early spring (i.e., March to May). Adults and sub-adults may be found in those rivers and streams until November, and in estuarine or marine waters during the remainder of the year. Sturgeon less than two years old appear to remain in riverine habitats and estuarine areas throughout the year, rather than migrate to marine waters. Habitat alterations such as those caused by water control structures that limit and prevent spawning, poor water quality, and over-fishing have negatively affected this species.

On March 19, 2003, the Service and the National Marine Fisheries Service (NMFS) published a final rule in the Federal Register (Volume 68, No. 53) designating critical habitat for the Gulf sturgeon in Louisiana, Mississippi, Alabama, and Florida. Portions of the Pearl and Bogue Chitto Rivers, Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, The Rigolets, Lake St. Catherine, and Lake Borgne within Louisiana were included in that

designation. While sturgeon have been documented in study area waterways, those waterways are not designated critical habitat.

Federally listed as an endangered species, West Indian manatees (*Trichechus manatus*) occasionally enter Lakes Pontchartrain and Maurepas, and associated coastal waters and streams during the summer months (i.e., June through September). Manatee occurrences appear to be increasing, and they have been regularly reported in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, and in canals within the adjacent coastal marshes of Louisiana. They have also been occasionally observed elsewhere along the Louisiana Gulf coast. The manatee has declined in numbers due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution. Cold weather and outbreaks of red tide may also adversely affect these animals. Should the proposed project involve activity in the aquatic environment in those areas during summer months, further consultation with this office will be necessary.

Other Federal Trust Species

The project-area forested wetlands may provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which was officially removed from the List of Endangered and Threatened Species on August 8, 2007. Bald eagles nest in Louisiana from October through mid-May. Eagles typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water in the southeastern Parishes. Areas with high numbers of nests include the Lake Verret Basin south to Houma, the marsh/ridge complex south of Houma to Bayou Vista, the north shore of Lake Pontchartrain, and the Lake Salvador area. Eagles also winter, and infrequently nest, in mature pine trees near large lakes in central and northern Louisiana. Major threats to this species include habitat alteration, human disturbance, and environmental contaminants (i.e., organochlorine pesticides and lead).

Breeding bald eagles occupy "territories" that they will typically defend against intrusion by other eagles, and that they likely return to each year. A territory may include one or more alternate nests that are built and maintained by the eagles, but which may not be used for nesting in a given year. Potential nest trees within a nesting territory may, therefore, provide important alternative bald eagle nest sites. Shoreline trees or snags located near large waterbodies provide the visibility and accessibility needed to locate aquatic prey. Bald eagles are vulnerable to disturbance during courtship, nest building, egg laying, incubation, and brooding. Disturbance during this critical period may lead to nest abandonment, cracked and chilled eggs, and exposure of small young to the elements. Human activity near a nest late in the nesting cycle may also cause flightless birds to jump from the nest tree, thus reducing their chance of survival.

Although the bald eagle has been removed from the List of Endangered and Threatened Species, it continues to be protected under the MBTA and the BGEPA. The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at:

<http://www.fws.gov/southeast/es/baldeagle/NationalBaldEagleManagementGuidelines.pdf>. Those guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. On-site personnel should be informed of the possible presence of nesting bald eagles within the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary. The Division of Migratory Birds for the Southeast Region of the Service (phone: 404/679-7051, e-mail: SEmigratorybirds@fws.gov) has the lead role in conducting such consultations. Should you need further assistance interpreting the guidelines or performing an on-line project evaluation, please contact this office.

The proposed study area is known to support colonial nesting waterbirds. Colonies may be present that are not currently listed in the database maintained by the Louisiana Department of Wildlife and Fisheries (LDWF). That database is updated primarily by monitoring the colony sites that were previously surveyed during the 1980s. Until a new, comprehensive coast-wide survey is conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season. To minimize disturbance to colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present). In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season.

Management Areas

As you are aware, the Maurepas Swamp Wildlife Management Area (WMA) is located within the study area. Please contact the LDWF, Region 7 Office (225/765-2360), for further information regarding any additional permits that may be required to perform work on that WMA.

In addition, two federally approved wetland mitigation banks are located within the study area including the Sawgrass Bayou Mitigation Area owned by Blind River Properties (Mr. Dale Martin, 225/698-2700), and Lake Maurepas Mitigation Area owned by Stream Properties, LLC (Mr. Jeff Peterson, 337/433-1055, ext. 20). If the proposed project entails work within or adjacent to those bank sites, or if an alternative could potentially alter the hydrology of those sites, then the bank sponsors should be contacted.

POTENTIAL SIGNIFICANT IMPACTS

Depending on the alignment, construction of a flood protection levee has the potential to result in the direct loss and enclosure of valuable swamp and bottomland hardwood habitats. Developmental pressures on enclosed forested wetlands would likely increase with levee construction due to the reduced threat of flooding in the area. Reduced water exchange in the enclosed wetlands would lead to further water quality deterioration in the Lake Pontchartrain Basin by eliminating or reducing the filtering capacity of those wetlands. Wetland habitat losses would reduce populations of resident fish and wildlife, reduce important wintering habitat for waterfowl and other migratory birds, and reduce nursery habitat and detritus input important to the maintenance of estuarine-dependent fish and shellfish production.

PROBLEMS, OPPORTUNITIES, AND PLANNING OBJECTIVES

The most significant fish and wildlife related problem in the study area and throughout coastal Louisiana is the rapid loss of valuable wetland habitat. Between 1956 and 1978, baldcypress-tupelogum swamp within the Lake Pontchartrain Basin declined by 43,596 acres and total marsh declined by 79,232 acres (Bahr et al. 1983). During that same period, estuarine open water increased by more than 140,300 acres. This transition from vegetated wetlands to open water is believed to be associated with navigation and flood control projects, oil and gas exploration and extraction activities, shoreline erosion, subsidence, and saltwater intrusion. Between 1978 and 1988, over 23,000 acres of swamp between Lake Pontchartrain and Lake Maurepas were converted to marsh, due to the above factors. Land loss in those swamps in the next 20 years should reach approximately 1,200 acres. Approximately, 3,500 acres of marsh and nearly 6,300 acres of swamp are projected to be lost by the year 2045 (Louisiana Coastal Wetlands Conservation and Restoration Task Force 1993).

As a part of the 2004, Louisiana Coastal Area Ecosystem Restoration Study (LCA Plan) several near-term restoration projects have been identified for this hydrologic basin including the Blind River Diversion project and Hope Canal diversion project, which is also being evaluated under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) program. The goals of those restoration projects along with the coastal flood protection goals of the proposed study are interrelated and necessitate an integrated solution. Those projects should be designed in collaboration with one another to ensure that a system-wide solution for coastal flood protection and restoration for the Lake Pontchartrain basin is achieved.

Deteriorating water quality in the Lake Pontchartrain Basin is at least partially correlated to the loss of that basin's wetlands; hence, a reduction in the waste assimilation capacity of the area is another problem adversely affecting fish and wildlife in the study area. According to Schurtz et al. (1984), factors adversely affecting water quality in Lake Pontchartrain are those related to urban development and urban pollution, altered land use patterns, and hydrologic modifications within the lake's watershed.

Water quality deterioration may be minimized by preserving remaining wetlands via limiting

urban expansion and associated pollution discharges into wetlands. To that end, in order to discourage further wetland loss, the proposed hurricane protection levee should be at or as close to the wetland/non-wetland interface as possible. Should some wetlands be unavoidably enclosed within the levee, the integrity of present hydrologic regimes should be maintained via installation of water control structures in the levee to ensure adequate water circulation. Preservation of enclosed wetlands could be ensured via the purchase of non-development easements or local flood zoning ordinances. Furthermore, any pumping stations associated with the project should not discharge directly into canals or other open water bodies, but rather into wetland systems that can assimilate those nutrients being discharged.

The Corps is currently planning and implementing the construction of hurricane and flood protection projects to their newly-authorized protection levels for the Greater New Orleans area. It is currently estimated that approximately 75 million cubic yards of material would be needed to achieve the authorized level of protection for that project. The combined need for borrow necessary to complete authorized flood protection improvements and construction of proposed Federal and non-Federal hurricane and flood protection levees may exceed local availability. The searches for levee-building material has been conducted on a project-by-project basis, and has led to the least-expensive and easiest sources for borrow material, which are usually located within wetlands and/or bottomland hardwoods adjacent to the proposed levee. Use of such on-site sources often has adverse impacts on wetlands and is frequently inconsistent with coastal restoration efforts. Use of those sites will be counterproductive with respect to minimizing wetland impacts and attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem.

In order to address the above problems and opportunities, the Service recommends that the following planning objectives and constraints be included in any further planning of hurricane protection features for the study area:

1. Preserve and/or minimize impacts to wetlands and bottomland hardwoods in the study area.

2. The Service's priority selection process for borrow material outlined in our August 7, 2006, letter to the Corps regarding the Greater New Orleans Hurricane and Storm Damage Risk Reduction project (enclosed) should be utilized. In addition, the Service provided, via a September 9, 2008, letter, a map identifying potential borrow areas that are likely to have minimal impacts to fish and wildlife resources. Areas identified on that map should be investigated first as potential borrow sources.

3. Coordinate with the planning objectives and planning team of the LCA Plan near-term restoration projects identified for the Lake Pontchartrain Basin, particularly the Hope Canal Diversion project.

4. Avoid impacts to threatened and endangered species and their habitat.

FISH AND WILDLIFE CONSERVATION MEASURES

Implementation of the proposed levee could potentially have significant direct impacts on fish and wildlife resources. Of equal concern is the potential for loss, via future development, of fish and wildlife habitat enclosed by the levee. The Service believes that project plans can be designed to mitigate those negative impacts.

The President's Council on Environmental Quality defined the term "mitigation" in the National Environmental Policy Act regulations to include: (a) avoiding the impact altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or providing substitute resources or environments.

The Service's Mitigation Policy (Federal Register Volume 46, No. 15, January 23, 1981) supports and adopts this definition of mitigation and considers its specific elements to represent the desirable sequence of steps in the mitigation planning process. That policy identifies four resource categories that are used to insure that the level of mitigation recommended by Service biologists will be consistent with the fish and wildlife resource values involved.

Considering the high value for fish and wildlife and the relative scarcity of the forested wetlands potentially impacted by the proposed levee, those wetlands have been designated Resource Category 2 habitats. The mitigation goal for habitats in this resource category is no net loss of in-kind habitat value. This goal could best be achieved via loss avoidance; in this case, realigning the levee such that forested wetlands lost to levee construction would be minimized and forested wetlands would not be enclosed within the levee.

If the enclosure of wetlands within the proposed levee is necessary to provide for floodwater storage, mechanisms for protecting enclosed wetlands and for compensating habitat value losses associated with levee construction would have to be developed. Preservation of enclosed wetlands might be accomplished by installing water control structures in the levee that could be properly operated to ensure adequate water exchange. Further, protection of the enclosed wetlands from future development (thus preserving floodwater storage areas) could be ensured via purchase of non-development easements. Compensation for wetland habitat value losses associated with levee construction would likely involve acquisition and management of another similar wetland area. Detailed mitigation needs will be determined in the feasibility stage.

1. Mitigate impacts to wetlands and bottomland hardwoods by:

    A. Incorporating hurricane protection features (e.g., floodwalls, etc.) that would minimize impacts to fish and wildlife habitat;

    B. Requiring that hurricane protection levees follow, as closely as possible, the wetland/non-wetland interface and limiting hurricane protection to existing

urban developments;

C. Requiring that borrow needed for levee construction be taken from non-forested, non-wetland areas [the Service's priority selection process for borrow material should be utilized, and areas identified on the Service's potential borrow map should be investigated (enclosures)];

D. Installing an adequate number of water-control structures in hurricane protection levees that enclose wetlands to maintain normal water exchange and preclude drainage (such structures should be closed only in advance of tropical storms);

E. Acquiring non-development easements on enclosed wetlands to ensure their continued use as floodwater storage areas and to preclude any secondary development;

F. Incorporating water quality improvements by routing urban runoff through enclosed wetlands and discharging any pumped water into floodside wetlands;

F. Ensuring adequate internal drainage exists within the leveed area to prevent levees from compounding existing flooding problems, thus leading to future flood control projects with a resulting loss of wetlands and fish and wildlife resources; and,

G. Implementing measures to compensate for unavoidable losses of wetland habitat values.

2. Avoid impacts to endangered or threatened species and their habitats.

3. Avoid impacts to active wading bird rookeries. Avoid construction activities within 1,500 feet of any active wading bird rookery during the nesting season.

UPCOMING FISH AND WILDLIFE ACTIVITIES

The following data will be needed to enable the Service to conduct a detailed analysis of project impacts on fish and wildlife resources and to formulate measures to mitigate any losses to those resources.

1. Identification of any new alternatives to be considered, including detailed project plans (e.g., a written description and map) for those alternatives.

2. An estimate of current, future-with and future-without-project development rates within the project area(s), presented in 10-year intervals, to be impacted by alternatives being considered.

3. Identification of habitats, by type and acreage, to be impacted by various

alternatives being considered. That data should also be presented in 10-year intervals.

We look forward to assisting the Corps in the documentation of existing conditions, development of alternatives, and assessment of effects of project alternatives on Federal trust resources during the subsequent feasibility study. Should you have any questions regarding our comments, please contact Angela Trahan (337/291-3137) of this office.

Sincerely,

James F. Boggs
Supervisor
Louisiana Field Office

Enclosures

cc: DOI, OEPC, Washington, D.C. (Attn.: Loretta Sutton)
DOI, OEPC, Albuquerque, NM (Attn.: Steven Spencer)
FWS, BAP & HC (ERT), Arlington, VA (Attn.: Stefanie Stavrakas)
FWS, Atlanta, GA (Attn.: Richard Warner)
EPA, Dallas, TX
NMFS, Baton Rouge, LA
LDWF, Region 7 Office, Baton Rouge, LA
LDWF, Baton Rouge, LA (Attn.: Heather Finley)
LDWF, Natural Heritage Program, Baton Rouge, LA

LITERATURE CITED

Bahr, L.M., Jr. R. Costanza, J.W. Day, S.E. Bayley, C. Neill, S.G. Leibowitz, and J. Fruci. 1983. Ecological characterization of the Mississippi Deltaic Plain Region: a narrative with management recommendations. U.S. Fish and Wildlife Service, Division of Biological Services, Washington, D.C. FWS/OBS-82/69. 189 pp.

Louisiana Coastal Wetlands Conservation and Restoration Task Force. 1993. Draft Louisiana Coastal Wetlands Restoration Plan, Pontchartrain Basin, Appendix A. 94 pp.

Schurtz, M.H., K.M. St. Pe. 1984. Report on Interim Findings: Water Quality Investigation of Environmental Conditions in Lake Pontchartrain. Louisiana Department of Environmental Quality, Water Pollution Control Division. 85 pp.

Wilson, B.C., C.A. Manlove, and C.G. Esslinger. 2002. North American Waterfowl Management Plan, Gulf Coast Joint Venture: Mississippi River Coastal Wetlands Initiative. North American Waterfowl Management Plan, Albuquerque, NM. 28 pp. + appendix.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

October 9, 2012

Colonel Edward R. Fleming
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Fleming:

The Fish and Wildlife Service (Service) is submitting this Planning-aid Letter (PAL) based upon recent information provided by the U.S. Army Corps of Engineers' (Corps) Project Delivery Team (PDT) for the West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study (WSLP) in Ascension, St. Charles, St. James, and St. John the Baptist Parishes, Louisiana. The Service is aware that the Corps plans to choose a Tentatively Selected Plan (TSP) by the end of 2012, and we submit the following recommendations for consideration in that project development decision in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This PAL does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act.

The Corps is conducting a study to determine the feasibility of providing Federal hurricane protection to the western shore of Lake Pontchartrain. The study area is bounded by the Bonnet Carré Spillway to the east, the Mississippi River to the south, Lakes Pontchartrain and Maurepas to the north, and St. James Parish/Ascension Parish line to the west. The communities in this area include Laplace, Reserve, Gramercy, Lutcher, Garyville, Riverland Heights, and Carrollwood. The Louisiana Department of Wildlife and Fisheries manages the Maurepas Wildlife Management Area (WMA), which consists of a majority of the swampland within the project area.

According to an August 2012 map provided by the PDT, there are three preliminary levee alignments which have been identified through previous reconnaissance and feasibility studies that are being considered for the TSP (Figure 1). Generally, those alignments extend from the west guide levee of the Bonnet Carré Spillway to the vicinity of Hope Canal north of Garyville in St. John the Baptist Parish. Alignment A generally follows the wetland/non-wetland interface from LaPlace to Hope Canal. Alignment C generally follows en existing pipeline corridor north of Alignment A. Alignments A and C both tie into the Mississippi River levee. Alignment D generally follows the Interstate Highway 10 (I-10) corridor and extends outside the original project study area into Ascension Parish to tie into an existing non-federal levee.

For descriptions of fish and wildlife resource conditions, threatened and endangered species, other species of management concern, and existing management areas within the project study area, please reference the Service's January 9, 2009, letter (enclosed) in response to the Corps' Notice of Intent to prepare a Draft Environmental Impact Statement. Those descriptions and concerns have not changed since our 2009 letter. Please note that the Service will provide guidelines for in-water work in areas that potentially support the endangered West Indian manatee (*Trichechus manatus*) to avoid and minimize impacts to that species during project construction. Also, on September 11, 2009, the Service published two federal regulations establishing the authority to issue permits for non-purposeful bald eagle take (typically disturbance) and eagle nest take when recommendations of the National Bald Eagle Management Guidelines (http://www.fws.gov/southeast/es/baldeagle/NationalBaldEagleManagementGuidelines.pdf) cannot be achieved. Should you need further assistance interpreting the guidelines, avoidance measures, or performing an on-line project evaluation to determine whether application for a permit is necessary, please contact this office.

Depending on the alignment, construction of a flood protection levee has the potential to result in the direct loss and enclosure of valuable swamp and bottomland hardwood habitats. Developmental pressures on enclosed forested wetlands would likely increase with levee construction due to the reduced threat of flooding in the area. Reduced water exchange in the enclosed wetlands would lead to further water quality deterioration in the Lake Pontchartrain Basin by eliminating or reducing the filtering capacity of those wetlands. Wetland habitat losses would reduce populations of resident fish and wildlife, reduce important wintering habitat for waterfowl and other migratory birds, and reduce nursery habitat and detritus input important to the maintenance of estuarine-dependent fish and shellfish production.

The Service recommends implementation of Alignment A because it discourages wetland loss by enclosing the least amount of wetlands, involves the least amount of direct wetland impacts due to construction, and has the least impact to the Maurepas WMA (Table 1). If implementation of Alignment A is determined to be infeasible, then the Service would support Alignment C because it is the next least-damaging alternative to Alignment A (Table 1). The Service discourages selection of Alignment D because of the amount and quality of forested wetlands that would be enclosed, the amount of direct impacts to high quality forested wetlands that would be affected during construction, the alteration of the present hydrologic regime over a much larger area of high quality fish and wildlife habitat, the enclosure of the southern portion of the Maurepas WMA (Table 1, Figure 2), and the impacts to two proposed coastal restoration projects (i.e., the Convent to Blind River Diversion and the Hope Canal Freshwater Reintroduction).

The Service is aware that Alignments A and C do not provide protection to the entrance and exit ramps to I-10 at its intersections with United States Highway 61 (Hwy 61) and Louisiana State Highway 641 (Hwy 641), which undergo flooding during excessive rainfall events as well as during major storm events. Those alignments would also not provide flood protection to structures within St. James Parish, which are included within the study area and for which that Parish would like flood protection. In order to provide maximum consideration to the conservation of fish and wildlife habitats, as well as to address the goals of the proposed study, the Service recommends that the Corps consider installing localized ring levees at I-10 and its intersections with Hwy 61 and Hwy 641 to eliminate flooding and to maintain evacuation and emergency vehicle routes between

Baton Rouge and New Orleans. We also recommend extending Alignment C along either: (1a) the wetland/non-wetland interface up to Louisiana State Highway 3125 (Hwy 3125) west of Grand Point; or (1b) Hwy 61 to its intersection with I-10. The Service proposes Alignments C-1a and C-1b (Table 1, Figure 2), along with the localized ring levees, as possible alternatives to Alignment D. Those additional alternatives would allow for reducing and minimizing impacts to fish and wildlife resources while providing flood protection for structures within St. James Parish as well as the major highway intersections that allow ingress and egress to the affected areas and maintain evacuation and emergency routes between Baton Rouge and New Orleans. The Service is willing to work with the Corps on a finalized alternative alignment.

Table 1. Proposed alignments and the Service's recommended alignment revisions for consideration as alternatives to Alignment D.

ALIGNMENT	LENGTH*	ENCLOSED WETLANDS*	IMPACTS, ISSUES, and PROTECTION
Alignment A	19 miles	5 square miles	• Least damaging alternative • Encloses minimal amount of wetlands • Least impacts to Maurepas WMA • No impacts to Convent/Blind River Diversion • Impacts to Hope Canal Diversion need to be addressed • Provides protection for Montz, Laplace, Reserve, Garyville
Alignment C	19 miles	16 square miles	• Second least damaging alternative • Encloses additional wetlands • Small impacts to Maurepas WMA • No impacts to Convent/Blind River Diversion • Impacts to Hope Canal Diversion need to be addressed • Provides protection for Montz, Laplace, Reserve, Garyville
Alignment C-1a	29 miles	20.5 square miles	• Encloses additional wetlands • Few impacts to Maurepas WMA • No impacts to Convent/Blind River Diversion • Impacts to Hope Canal Diversion need to be addressed • Provides protection for Montz, Laplace, Reserve, Garyville, Gramercy, Lutcher, Grand Point
Alignment C-1b	28 miles	61 square miles	• Encloses extensive wetland areas • Impacts the southwestern portion of Maurepas WMA • Impacts to Hope Canal Diversion need to be addressed • Impacts to Convent/Blind River Diversion need to be addressed • Provides protection for Montz, Laplace, Reserve, Garyville, Gramercy, Lutcher, Grand Point, Convent, Romeville
Alignment D	27 miles	79 square miles	• Encloses greatest amount of wetlands • Impacts southern portion of Maurepas WMA • Impacts to Hope Canal Diversion need to be addressed • Impacts to Convent/Blind River Diversion need to be addressed • Provides protection for Montz, Laplace, Reserve, Garyville, Gramercy, Lutcher, Grand Point, Convent, Romeville

* Unrefined estimates using ArcMap® and Corps' estimates from their Feasibility Scoping Meeting information.

Regardless of which alignment the Corps chooses as the TSP, the Service recommends that (1) the integrity of present hydrologic regimes be maintained via installation of water control structures in the levee to ensure adequate water circulation, and (2) preservation of enclosed wetlands be ensured in perpetuity via the purchase of non-development easements and/or local flood zoning ordinances. Providing perpetual preservation of enclosed wetlands would also provide for flood storage areas within the levee system during excessive rainfall events. The Service also recommends that any pumping stations associated with the project should not discharge directly into canals or other open water bodies, but rather into wetland systems that can assimilate those nutrients being discharged.

The Corps has almost completed full implementation of the newly-authorized protection levels for hurricane and flood protection projects in the Greater New Orleans area. The combined need for borrow necessary to complete authorized flood protection improvements and construction of other proposed and implemented Federal and non-Federal hurricane and flood protection levees may have diminished local availability. The searches for levee-building material have been conducted on a project-by-project basis, and have led to the least-expensive and easiest sources for borrow material, which are usually located within wetlands and/or bottomland hardwoods adjacent to the proposed levee. Use of such on-site sources often has adverse impacts on wetlands and is frequently inconsistent with coastal restoration efforts. Use of those sites will be counterproductive with respect to minimizing wetland impacts and attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem. The Service's priority selection process for borrow material outlined in our August 7, 2006, letter to the Corps regarding the Greater New Orleans Hurricane and Storm Damage Risk Reduction project (enclosed) should be utilized. In addition, the Service provided, via a September 9, 2008, letter, a map (enclosed) identifying potential borrow areas that are likely to have minimal impacts to fish and wildlife resources. Areas identified on that map should be investigated first as potential borrow sources. The Service will provide an updated map that is more specific to the subject study area.

We appreciate the Corps' consideration of our recommendations for further development of a TSP for the proposed project. Should you or your staff have any questions, or if you would like to meet with us regarding the content of this letter, please contact Ms. Brigette Firmin (337/291-3108) of this office.

Sincerely,

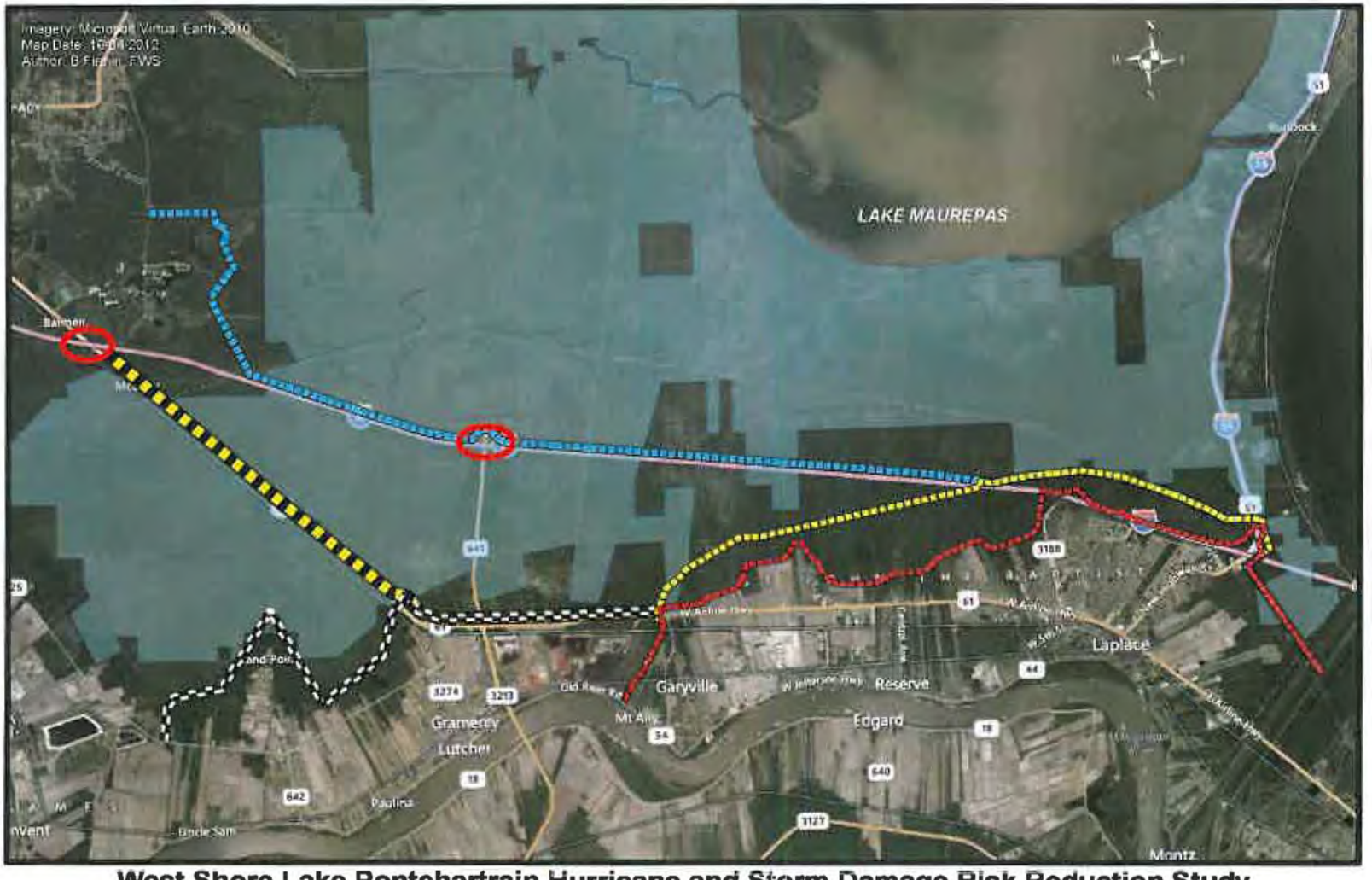
Jeffrey D. Weller
Supervisor
Louisiana Ecological Services Office

Enclosures

cc: EPA, Dallas, TX
LDWF, Baton Rouge, LA
CPRA, Baton Rouge, LA
LDNR, Coastal Management Division, Baton Rouge, LA

Figure 1. Currently proposed alignments for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study.

Figure 2. Proposed revised alignments for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506
August 7, 2006

Colonel Richard P. Wagenaar
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Wagenaar:

As you know, the U.S. Fish and Wildlife Service (Service) is assisting the U.S. Army Corps of Engineers (Corps) in assessing impacts of, and mitigation requirements for, borrow sites which are needed to complete authorized improvements, and to construct Federal and non-Federal hurricane/flood protection levees in southern Louisiana. These improvements to hurricane and flood control projects are authorized by the Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico (Public Laws 109-148, PL 84-99 and PL 109 234 (4th supplemental)). This letter is provided in accordance with the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), Fish and Wildlife Coordination Act (FWCA, 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and the Migratory Bird Treaty Act (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), but it does not constitute the final report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act.

Through the efforts of Task Force Guardian, the Corps has restored Hurricane Katrina-damaged hurricane/flood protection projects to their authorized or previously permitted/constructed protection levels. Identification of borrow areas needed to complete those repairs utilized a protocol that prioritized selection of those sites in the following order: existing commercial pits, upland sources, previously disturbed/manipulated wetlands within a levee system, and low-quality wetlands outside a levee system. The Service supports the use of such protocols to avoid and minimize impacts to wetlands and bottomland hardwoods within project areas. Avoidance and minimization of those impacts helps to provide consistency with restoration strategies and compliments the authorized hurricane protection efforts. Such consistency is also required by Section 303(d)(1) of the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA).

Accordingly, the Service recommends that prior to utilizing borrow sites every effort should be made to reduce impacts by using sheetpile and/or floodwalls to increase levee heights wherever feasible. In addition, the Service recommends that the following protocol be adopted and utilized to identify borrow sources in descending order of priority:

1. Permitted commercial sources, authorized borrow sources for which environmental clearance and mitigation have been completed, or non-functional levees after newly constructed adjacent levees are providing equal protection.

2. Areas under forced drainage that are protected from flooding by levees, and that are:

   a) non-forested (e.g., pastures, fallow fields, abandoned orchards, former urban areas) and non-wetlands;

   b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands(e.g., wet pastures), excluding marshes;

   c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).

3. Sites that are outside a forced drainage system and levees, and that are:

   a) non-forested (e.g., pastures fallow fields, abandoned orchards, former urban areas) and non-wetlands;

   b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands(e.g., wet pastures), excluding marshes;

   c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).

Notwithstanding this protocol, the location, size and configuration of borrow sites within the landscape is also critically important. Coastal ridges, natural levee flanks and other geographic features that provide forested/wetland habitats and/or potential barriers to hurricane surges should not be utilized as borrow sources, especially where such uses would diminish the natural functions and values of those landscape features.

To assist in expediting the identification of borrow sites, the Service recommends that immediately after the initial identification of a new borrow site the Corps should initiate informal consultation with the Service regarding potential impacts to federally listed threatened or endangered species. To aid you in complying with those proactive consultation responsibilities, the Service has enclosed a list of threatened and endangered species and their critical habitats within the coastal parishes of the New Orleans District.

The Service offers the following additional recommendations for reducing borrow site impacts on fish and wildlife resources and, where feasible, enhancing those resources. However, these additional recommendations should not be implemented if they would result in the expansion of existing borrow pits or construction of new borrow pits in wetlands or bottomland hardwoods.

1. A minimum of 30 percent of the borrow pits' edge should slope no greater than 5 horizontal (H):1 vertical (V), starting from the water line down to a depth of approximately 5 feet.

2. Most of the woody vegetation removed during clearing and grubbing should be placed into the deepest parts of the borrow pits and the remaining debris should be placed in the water along the borrow pit shorelines, excluding those areas where the 5H:1V slope, per recommendation 1, have been constructed.

3. Following construction, perimeter levees (if constructed) around each borrow pit should be gapped at 25-foot intervals with an 8-foot-wide breach, the bottom elevation of which should be level with the adjacent natural ground elevation.

When avoidance and minimization of bottomland hardwood and wetland impacts is not practicable, all unavoidable net losses of these habitats should be fully offset via compensatory mitigation. Such compensatory mitigation should sited within the watershed and/or hydrologic unit where the impact occurred, and should be completed concurrently with borrow operations, or as soon thereafter as possible.

The combined need for borrow necessary to complete authorized improvements to and construction of Federal and non-Federal hurricane/flood protection levees, and the potential construction of levees capable of withstanding a category 5 hurricane, will require substantial amounts of borrow. It is highly likely such amounts would exceed local availability. In the case of ongoing hurricane/flood protection projects (e.g., Morganza to the Gulf) the search for levee-building material has been conducted primarily on project-by-project basis. In the context of such project-by-project searches for borrow material, the least-expensive and easiest sources of borrow material are usually located within wetlands and/or bottomland hardwoods, adjacent to the proposed levee. Such on-site sources, however, often involve adverse impacts to wetlands, thus exacerbating the overall wetland loss problem in all coastal basins, especially those in the deltaic plain of southeast Louisiana. In short, while such on-site sources are relatively inexpensive, they will frequently be inconsistent with coastal restoration efforts and, to the extent that wetlands will be adversely impacted, use of those sites will be counterproductive with respect to minimizing wetland impacts and attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem.

Large-scale, off-site borrow sources could have the potential to reduce environmental impacts from levees and expedite project-by-project environmental review. Such potential "programmatic" borrow sources could include uplands along the Mississippi River, beneficial use of sediments dredged for navigation purposes (including the mining of disposal sites), the Mississippi River, and offshore deposits (e.g., Ship Shoal). As part of the planning process, we recommend that the Corps begin investigating the practicability of various large-scale, off-site borrow sources and actively involve all resource agencies with the Protection and Restoration Office's Borrow Team efforts.

Programmatic planning would be essential to identify borrow sites of acceptable quantity and quality, while avoiding and/or minimizing adverse environmental impacts. We therefore recommend that a plan be developed that integrates borrow resources, uses, and needs for various programs and activities. Guiding principles should be developed to identify borrow resources, borrow-site designs, and prioritize uses to avoid competing for resources, maximize benefits with those resources, and avoid adverse environmental impacts.

We appreciate the opportunity to provide this planning-aid letter and would be pleased to assist your agency in further identification of potential borrow sources. Should you or your staff have any questions regarding this letter, please contact David Walther (337/291-3122) of this office.

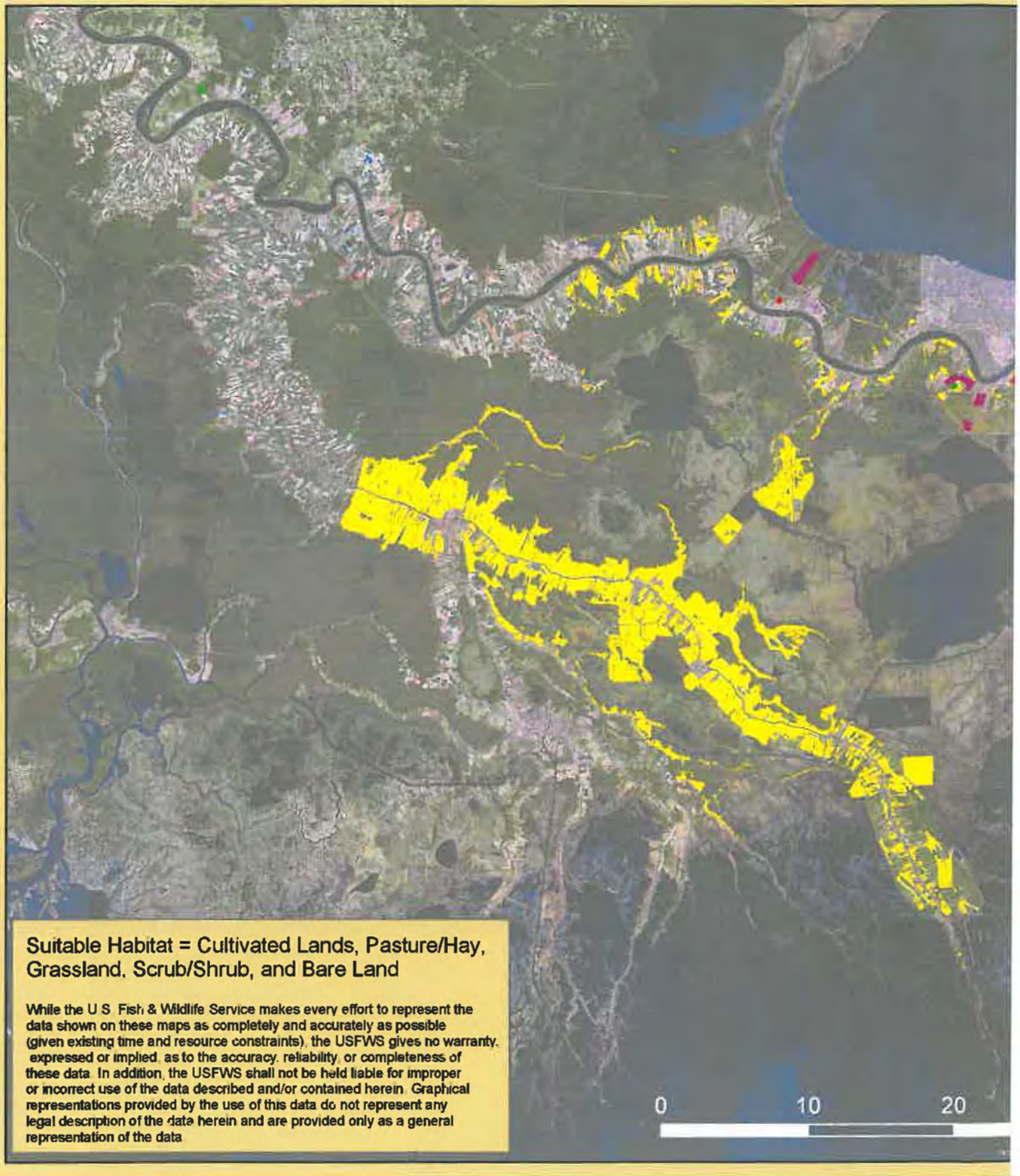
Sincerely,

Russell C. Watson
Supervisor
Louisiana Field Office

Enclosure

cc: National Marine Fisheries Service, Baton Rouge, LA
EPA, Dallas, TX
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources, CMD, Baton Rouge, LA
LA Dept. of Natural Resources, CRD, Baton Rouge, LA

U.S. Fish & Wildlife Service



Suitable Habitat = Cultivated Lands, Pasture/Hay, Grassland, Scrub/Shrub, and Bare Land

While the U S Fish & Wildlife Service makes every effort to represent the data shown on these maps as completely and accurately as possible (given existing time and resource constraints), the USFWS gives no warranty, expressed or implied, as to the accuracy, reliability, or completeness of these data In addition, the USFWS shall not be held liable for improper or incorrect use of the data described and/or contained herein Graphical representations provided by the use of this data do not represent any legal description of the data herein and are provided only as a general representation of the data

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex I

Technical, Institutional and Public Significance of Relevant Resources

Table I-1: Significance of relevant resources located within the project area.

Resource	Institutionally Significant	Technically Significant	Publicly Significant
Soils, Water bottoms, Prime and Unique Farmlands	Council on Environmental Quality (CEQ) memorandum dated August 11, 1980, entitled "Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act (NEPA)"; Executive Order 11990 - Protection of Wetlands; Agriculture and Food Act of 1981 (Public Law 97-98) containing the Farmland Protection Policy Act (PL 97-98; 7 U.S.C. 4201 *et seq.*).	Technically significant in determining soils engineering and environmental suitability, based on their physical and chemical properties, for proposed activities. Water bottoms are technically significant because the estuarine bottom sediment characteristics (water bottoms) benthic organismal distribution and is an integral component of the benthic boundary layer.	Significant to the public for determining suitability of construction capabilities, agriculture suitability, and suitability for septic tank type disposal of sanitary waste.
Hydrology	NEPA of 1969; Clean Water Act of 1972; Storm damage Control Act of 1944; Coastal Barrier Resources Act of 1982; Rivers and Harbors Act of 1899; River and Harbor and Storm damage Control Act of 1970; Watershed Protection and Storm damage Prevention Act of 1954; Submerged Lands Act of 1953; Coastal Zone Management Act of 1972; Safe Drinking Water Act of 1974; Estuary Protection Act of 1968; Resource Conservation and Recovery Act of 1976; Comprehensive Environmental Response, Compensation and Liability Act of 1980; Executive Order 11988 Floodplain Management.	Civil Works water resources development projects typically impact (positively or negatively) the interrelationships and interactions between water and its environment.	Publicly significant because the public demands clean water, hazard-free navigation, and protection of estuaries and floodplain management.
Water Quality	Clean Water Act of 1972; Pollution Prevention Act of 1990, the Safe Drinking Water Act of 1974; Water Resources Planning Act of 1965.	Technically significant to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.	Publicly significant because of the desire for clean water and water-related activities such as boating, swimming, fishing, and as a source of potable water.
Vegetation Resources	Coastal Barrier Resources Act of 1982; Coastal Zone Management Act of 1972; Emergency Wetlands Resources Act of 1986; Estuary Protection Act of 1968; Fish and Wildlife Conservation Act of 1980; Fish and Wildlife Coordination Act of 1958; NEPA of 1969; North American Wetlands Conservation Act of 1989; the Water Resources Development Acts of 1976, 1986, 1990, and 1992; Executive Order 13186 - Migratory Bird Habitat Protection.	Technically significant because they are a critical element of the barrier shoreline habitats. Vegetation resources serve as the basis of productivity, contribute to ecosystem diversity, provide various habitat types for fish and wildlife, and are an indicator of the health of coastal habitats.	Publicly significant because of the high priority that the public places on their aesthetic, recreational, and commercial value.
Wildlife Resources	NEPA of 1969; Coastal Zone Management Act of 1972; Estuary Protection Act of 1968; Fish and Wildlife Coordination Act of 1958; Migratory Bird Conservation Act of 1929; Migratory Bird Treaty Act of 1918; Endangered Species Act of 1973; Fish and Wildlife Conservation Act of 1980; North American Wetlands Conservation Act of 1989; Executive Order 13186 - Migratory Bird Habitat Protection; Marine Mammal Protection Act of 1972.	Technically significant because they are a critical element of the barrier shoreline ecosystem, they are an indicator of the health of various coastal habitats, and many wildlife species are important recreation and commercial resources.	Publicly significant because of the high priority that the public places on their aesthetic, recreational, and commercial value.

Table I-1: Significance of relevant resources located within the project area.

Resource	Institutionally Significant	Technically Significant	Publicly Significant
Aquatic Resources	National Environmental Policy Act of 1969; Coastal Zone Management Act of 1972; Estuary Protection Act of 1968.	Technically significant because plankton provide a major, direct food source for animals in the water column and in the sediments; are responsible for at least 40 percent of the photosynthesis occurring on the earth; important for their role in nutrient cycling; plankton productivity is a major source of primary food-energy for most estuarine systems throughout the world; and phytoplankton production is the major source of autochthonous organic matter in most estuarine ecosystems (Day et al. 1989).	Publicly significant because plankton constitute the lowest trophic food level for many larger organisms important to commercial and recreational fishing. There is also public health concern with noxious plankton blooms (red and brown tides) that produce toxins, and large-scale blooms can lead to hypoxic conditions, which can result in fish kills.
Fisheries	Fish and Wildlife Coordination Act of 1958; Endangered Species Act of 1973; Magnuson-Stevens Fishery Conservation and Management Act of 1976; Coastal Zone Management Act of 1972; Estuary Protection Act of 1968.	Technically significant because they are a critical element of many valuable freshwater and marine habitats, they are an indicator of the health of various freshwater and marine habitats, and many fish species are important commercial resources.	Publicly significant because of the high priority that the public places on their esthetic, recreational, and commercial value. Fisheries resources in the project area include marine and estuarine finfish and shellfish.
Essential Fish Habitat	Magnuson-Stevens Fishery Conservation and Management Act of 1976.	Technically significant because it includes those waters and substrate necessary to Federally-managed fish species for spawning, breeding, feeding or growth to maturity.	Publicly significant because of the high value that the public places on seafood and the recreational and commercial opportunities it provides.
Threatened and Endangered Species	Endangered Species Act of 1973; Marine Mammal Protection Act of 1972; Bald Eagle Protection Act of 1940.	Technically significant because the status of such species provides an indication of the overall health of an ecosystem.	Publicly significant because of the desire of the public to protect them and their habitats.
Cultural and Historic Resources	National Historic Preservation Act of 1966; Abandoned Shipwreck Act of 1987; Archeological Resources Protection Act of 1979; National Environmental Policy Act of 1969.	Technically important because of their association or linkage to past events, to historically important persons, and to design and/or construction values; and for their ability to yield important information about prehistory and history.	Publicly important because preservation groups and private individuals support their protection, restoration, enhancement, or recovery.
Recreational Resources	Federal Water Project Recreation Act of 1965; Land and Water Conservation Fund Act of 1965.	Technically significant because of the high economic value of recreational activities and their contribution to local, state, and national economies.	Publicly significant because of the high value that the public places on fishing, hunting, and boating, as measured by the large number of fishing and hunting licenses sold in Louisiana, and the large per-capita number of recreational boat registrations in Louisiana.
Air Quality	Clean Air Act of 1963, as amended, and the Louisiana Environmental Quality Act of 1983, as amended.	Air quality is technically significant because of the status of regional ambient air quality in relation to the National Ambient Air Quality Standards (NAAQS).	Air quality is publicly significant because of the desire for clean air and public health concerns expressed by many citizens.
Socioeconomic and Human Resources	National Environmental Policy Act of 1969; Estuary Protection Act of 1968; Clean Water Act of 1972; Rivers and Harbors Act of 1899; Watershed Protection and Storm damage Protection Act of 1954. Executive Order 12898 of 1994 – Environmental Justice.	Technically significant because the social and economic welfare of the Nation may be positively or adversely impacted by the proposed action; the social and economic welfare of minority and low-income populations may be positively or disproportionately impacted by proposed actions.	Publicly significant because of the public's concern for health, welfare, and economic and social well-being from water resources projects; also public concerns about the fair and equitable treatment of all people

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex J

Environmental Compliance Laws

Table J-1: Relevant Environmental Federal Statutory Authorities and Executive Orders. (Note: this list is not complete or exhaustive.)	
Abandoned Shipwreck Act of 1987	Marine Mammal Protection Act of 1972
American Indian Religious Freedom Act of 1978	Marine Protected Areas (EO 13158) of 2000
Anadromous Fish conservation Act of 1965	Marine Protection, Research, and Sanctuaries Act of 1972
Antiquities Act of 1906	Migratory Bird Conservation Act of 1929
Archeological Resources Protection Act of 1979	Migratory Bird Treaty Act of 1918
Archeological and Historical Preservation Act of 1974	Migratory Bird Habitat Protection (EO 13186) of 2001
Bald Eagle Protection Act of 1940	National Environmental Policy Act of 1969
Clean Air Act of 1970	National Historic Preservation Act of 1966
Clean Water Act of 1977	Native American Graves Protection and Repatriation Act of 1990
Coastal Barrier Improvement Act of 1990	Neotropical Migratory Bird Conservation Act of 2000
Coastal Barrier Resources Act of 1982	Noise Control Act of 1972
Coastal Wetlands Planning, Protection, and Restoration Act of 1990	Nonindigenous Aquatic Nuisance Prevention and Control Act of 1996
Coastal Zone Management Act of 1972	North American Wetlands Conservation Act of 1989
Comprehensive Environmental Response, Compensation, and Liability Act of 1980	Oil Pollution Act of 1990
Consultation and Coordination with Indian Tribal Governments (EO 13175) of 2000	Outer Continental Shelf Lands Act of 1953
Emergency Planning and Community Right-to-Know Act of 1986	Pollution Prevention Act of 1990
Emergency Wetlands Restoration Act of 1986	Prime and Unique Farmlands, 1980 CEQ Memorandum
Endangered Species Act of 1973	Protection and Enhancement of the Cultural Environment (EO 11593) of 1971
Environmental Quality Improvement Act of 1970	Protection and Enhancement of Environmental Quality (EO 11991) of 1977
Estuaries and Clean Water Act of 2000	Protection of Children from Environmental Health Risks and Safety Issues (EO 13045) of 1997
Estuary Protection Act of 1968	Protection of Cultural Property (EO 12555) of 1986
Estuary Restoration Act of 2000	Protection of Wetlands (EO 11990) of 1977
Exotic Organisms (EO 11987) of 1977	Reclamation Projects Authorization and Adjustments Act of 1992
Farmland Protection Policy Act of 1981	Recreational Fisheries (EO 12962) of 1995
Federal Actions to Address Environmental Justice in Minority Populations & Low-Income Populations (EO 12898) of 1994	Resource Conservation and Recovery Act of 1976
Federal Emergency Management (EO 12148) of 1979	Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186) of 2001
Federal Facilities Compliance Act of 1992	Rivers and Harbors Acts of 1899 and 1956
Federal Land Policy and Management Act of 1976	River and Harbor and Flood Control Act of 1970
Federal Water Pollution Control Act of 1972	Safe Drinking Water Act of 1974
Federal Water Project Recreation Act of 1965	Submerged Land Act of 1953
Fish and Wildlife Conservation Act of 1980	Sustainable Fisheries Act of 1996
Fish and Wildlife Coordination Act of 1934	Toxic Substances Control Act of 1976
Flood Control Act of 1944	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970
Floodplain Management (EO 11988) of 1977	Water Resources Development Acts of 1976, 1986, 1990, 1992, and 2007
Food Security Act of 1985	Water Resources Planning Act of 1965
Greening of the Government Through Efficient Energy Management (EO 13148) of 2000	Watershed Protection & Flood Prevention Act of 1954
Historic Sites Act of 1935	Water Pollution Control Act Amendments of 1972
Historical and Archeological Data-Preservation Act of 1974	Wild and Scenic River Act of 1968
Indian Sacred Sites (EO 13007) of 1996	Wilderness Act of 1964
Invasive Species (EO 13112) of 1999	
Land & Water Conservation Fund Act of 1965	
Magnuson-Stevens Fishery Conservation and Management Act of 1976	

Table J-2: Relevant Environmental State Statutory Authorities.

(Note: this list is not complete or exhaustive.)	
Air Control Act	Louisiana Threatened and Endangered Species and Rare & Unique Habitats
Archeological Treasury Act of 1974	Protection of Cypress Trees
Louisiana Coastal Resources Program	Water Control Act
Louisiana Scenic Rivers Act of 1988	

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex K

Mitigation Plan

(Includes the Adaptive Management and Monitoring Plan)

APPENDIX A - ANNEX K

West Shore of Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study
Mitigation and Adaptive Management Plan
April 2014

1. INTRODUCTION

A SMART Planning approach was used to assemble the mitigation plan by drawing from many existing reports for restoration actions in nearby swamps. The mitigation plan to compensate for project-related direct and indirect impacts to swamp and Bottomland-Hardwood-Wet (BLH) is a feature of the recommended West Shore Lake Pontchartrain hurricane and storm damage risk reduction project (Project).[1] The plan complies with the requirements of the Water Resources Development Acts of 1986 and 2007, US Army Corps of Engineers (USACE) regulations, and mitigation standards.

2. MITIGATION OBJECTIVES

The objective of the mitigation plan is to restore swamp and BLH habitat to fully compensate for Project-related impacts. Wetland Value Assessment (WVA) models were run on the Project levee footprint to determine the functions and values of the impacted habitats. These results are expressed in Average Annual Habitat Units (AAHU) in Table K-1. The models predict that approximately 1,189 AAHUs would be lost due to direct and indirect habitat impacts over the 50-year period of analysis. This impact sets the mitigation requirement that must be delivered by the mitigation plan.

Table K-1. Wetland habitat impacts.

Habitat	Direct Impacts		Indirect Impacts		Total Impacts[2]	
	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs
Swamp[3]	1,112	595	8,432	495	9,544	1,090
Bottomland Hardwood	124	96	89	3	213	99
Total	***1,236***	***691.1***	***8,521***	***497.6***	***9757***	***1,189***

Six mitigation plan components will provide the required compensation for habitat impacts.

- The first feature mitigates for BLH impacts through the construction of a project that creates BLH in the Bonnet Carré Spillway.[4]

[1] Plan details will be further developed in Preconstruction Engineering and Design. USACE will coordinate with agencies, the Non-Federal Sponsor, and others during design to refine and modify the plan if necessary.
[2] Figures are rounded up.
[3] Includes 1.1 acres of impacts from berm features.
[4] This plan was developed as an alternative considered in the Lake Pontchartrain and Vicinity Hurricane and Storm Damage Risk Reduction System, Programmatic Individual Environmental Report for mitigation. This alternative was recommended as a backup measure to the recommended plan, but is no longer needed as a backup. (U.S. Army

- Five components collectively compensate for Project swamp impacts. The components are:
    - Purchasing credits from a swamp mitigation bank
    - Blind River Diversion Canal Swamp Restoration[5]
    - Bonnet Carré Swamp Restoration[6]
    - Maurepas Crawfish Ponds Swamp Restoration
    - Lutcher Polder Farmlands Swamp Restoration

Table K-2 lists the mitigation plan components, the acreage of each component, and the net gain in AAHUs from each component over a 50-year period of analysis.

Table K-2. Mitigation plan components.

Mitigation Project ID*	Proposed Components	Acres	Net Gain AAHUs[7]
BLH1	Bonnet Carré Bottomland Hardwood Restoration	156	99
SWMP1	Swamp Mitigation Bank Credit Purchase	n/a	72
SWMP2	Blind River Swamp Restoration	1,040	339
SWMP3	Bonnet Carré Swamp Restoration	310	121
SWMP4	Maurepas Crawfish Ponds Restoration	1,161	407
SWMP6	Lutcher Polder Farmlands Swamp Restoration	348	151
TOTAL		3,015	1,189

**SWMP5 (Milton Island Swamp Restoration) was removed from the plan; the 131 AAHUs from that site will be accomplished by expanding the acres at SWMP6.*

WVA modeling indicates that the total net gain from the proposed mitigation plan will be 1,189 AAHUs, while the total net loss resulting from all Project habitat impacts is 1,189 AAHUs. This indicates that the mitigation plan would fully compensate for the lost functions/values due to constructing and operating the Project.

3. MITIGATION WORK PLAN

The work plan components are identified in Table K-2 and described in Sections 3.1 – 3.6.[8] The first component, BLH1, described in Section 3.1, mitigates for the Project's BLH impacts.

Corps of Engineers, 2013. Programmatic Individual Environmental Report #36 for Lake Pontchartrain and Vicinity - Mitigation. See Appendix K. Bonnet Carré BLH-WET Restoration Project).

[5] This plan was originally developed as part of a Louisiana Coastal Area project called the Amite River Diversion Canal Hydrologic Modification. It entailed cutting gaps in a spoil bank and railroad embankment, dredging conveyance channels and planting vegetation. The project was not recommended in the LCA plan. A portion of the plan is being developed by Livingston Parish under the Coastal Impact Assistance Program. The tree plantings feature has been expanded to use as a mitigation project. Depending on the final CIAP project, some additional features may be developed during preconstruction engineering and design for the West Shore mitigation plan.

[6] This plan is as an alternative considered in the Lake Pontchartrain and Vicinity Hurricane and Storm Damage Risk Reduction System, Programmatic Individual Environmental Report for mitigation. This alternative was recommended as a backup measure to the recommended plan, but is no longer needed as a backup. See U.S. Army Corps of Engineers, 2013. Programmatic Individual Environmental Report #36 for Lake Pontchartrain and Vicinity. Appendix L. Bonnet Carré Swamp Restoration: Mitigation for LPV HSDRRS General Swamp Impacts.

[7] Required acre and AAHUs amounts are rounded up.

[8] Mitigation plans have been developed to a feasibility level of detail. Work during preconstruction engineering and design may result in refinements to the plans or necessitate additional planning to satisfy mitigation requirements.

Project swamp impacts will be mitigated by SWMP1, SWMP2, SWMP3, SWMP4, and SWMP6 described in Sections 3.2 – 3.6. The government will plant trees in connection with BLH1, SWMP2, SWMP3, SWMP4, and SWMP6. Section 3.7 describes the project planting designs. The plan components are shown in Figures K-1- K-5.[9]

Mitigation will be constructed concurrently with the other Project features. To the extent practicable, the initial mitigation construction will be started within 12 months of the original construction impacts. USACE will be responsible for initial construction of each mitigation feature and will cost-share the cost of such construction with the non-Federal sponsor as an item of total project cost in accordance with the terms of the Project Partnership Agreement (PPA). As soon as the initial construction of a mitigation feature, or of a functional portion of a mitigation feature, is completed by the USACE contractor, the District Commander will provide the non-Federal sponsor with a notice of initial construction completion (INCC) for that feature or for the functional portion of that feature. Thereafter, the non-Federal sponsor shall be responsible for the operation, maintenance, and repair, (OMR) of the INCC'd mitigation feature or functional portion thereof and all cost of the OMR of the INCC'd features or functional portion will be borne by the non-Federal sponsor.

However, on a cost-shared basis and subject to the availability of funds, USACE will continue to monitor the INCC'd mitigation features or functional portions and report its findings until such time as USACE determines that the initial success criteria have been attained for each such INCC'd mitigation feature, or functional portion. USACE monitoring of the completed mitigation features, or functional portions, will determine whether additional construction, or replanting, or invasive/nuisance species control is necessary to attain the initial success criteria. USACE mitigation construction, replanting, invasive/nuisance species control and eradication, monitoring, and reporting efforts that are conducted prior to its determination that initial success criteria have been attained shall be deemed to be an item of total project cost and shall be cost-shared with the non-Federal sponsor in accordance with the terms of the PPA.

The mitigation success criteria for this plan have been identified in section 6 of this document and include three categories. These categories are initial[10], intermediate, and long-term. Once initial success criteria are met for all of the resources associated with each INCC'd mitigation feature or functional portion, USACE will provide the non-Federal sponsor with a final notice of construction completion (FNCC) for the mitigation feature or functional portion. Thereafter, all activities for monitoring, reporting, replanting, and the eradication and control of invasive/nuisance will be deemed to be an item of operation, maintenance, repair, rehabilitation, and replacement (OMRR&R) cost and will be entirely borne by the non-Federal Sponsor.

If, after meeting initial success criteria, USACE determines that the mitigation feature or functional portion fails to meet its intermediate and/or long-term ecological success criteria, USACE in consultation with other agencies and the Non-Federal Sponsor, will determine whether operational changes would be sufficient to achieve ecological success criteria. All

[9] The referenced figures are provided at the end of this appendix.

[10] Only the following initial success criteria, as identified in Section 6 of this Mitigation Plan, will be used in the determination of FNCC: General Construction, No. 1; Native Vegetation, No. 2A. and B.; Invasive and Nuisance Species, No. 3.A. and B; and Topography, No 4.

operational changes will be deemed to be the OMRR&R responsibility of the non-Federal sponsor and all costs of such operational changes will be borne by the Non-Federal Sponsor. Examples of operational changes necessary to attain intermediate or long-term success criteria, could include, but would not be limited to actions such as thinning or controlling. If, instead, USACE determines that structural changes are necessary to achieve ecological success, USACE will implement appropriate adaptive management measures in accordance with the contingency plan outlined in this report. The provisions set forth in this paragraph are applicable to the entire proposed mitigation program (Mitigation and Adaptive Management (AM) plan) discussed herein.

3.1 BONNET CARRÉ BOTTOMLAND HARDWOOD RESTORATION (BLH1)

The Bonnet Carré Spillway was built between 1928 and 1931. During Mississippi River floods the project allows the diversion of flood waters into Lake Pontchartrain to relieve flood heights downriver. Some areas in the spillway are ideal sites for creating BLH habitat.

A BLH mitigation site has been identified in the spillway between Highway 61 and Interstate 10. The sites are in a severely disturbed area cleared and excavated to acquire borrow material. These activities have drastically altered normal topography, creating both depressions and ridges and have cleared prior wetland forests. Invasive and nuisance plant species, particularly black willow, have colonized these areas. The mitigation project will restore topography and BLH forest, thereby increasing the habitat functions and values. A secondary objective is to eradicate and control re-infestation by invasive and nuisance plant species to help to ensure the restored forests provide habitat and habitat functions and values typical of such forests.

The project would create 156 acres of BLH forests with dredged material and tree plantings. See Figure K-1 for an area map and details of the mitigation features. Proposed activities include the beneficial placement of dredged material from levee construction.

The BLH1 project features are:

- Clear and grub woody vegetation within the mitigation sites before fill placement. This includes mechanized removal of invasive and nuisance plants. Degrade certain existing earthen mounds and ridges within each site to the final target grade elevation. Perimeter ridges at each site will be left in place at this stage to serve as containment berms.

- Eradicate invasive/nuisance plant species within the sites through ground-based application of appropriate herbicides to the target species, prior to fill placement. Follow-up eradication before initial planting of native species within these features, as necessary.

- Placement of fill within the sites as necessary to attain the desired final target grade elevation of approximately 2.0 to 3.0 feet NAVD88. The fill material would be dredged from within the Project right of way and hauled in trucks to the mitigation site.[11]

[11] This is a different borrow plan than described in the LPV PIER. This beneficial use plan takes advantage of available materials from construction of the West Shore levee. The material is a by-product of muck out construction performed before placing levee grade fill material along the alignment.

- Final grading within the mitigation features after the fill deposited in these features has settled to the desired final target elevation, prior to initial planting of the features. This grading will be performed to remove any earthen ridges that remain projecting above the target grade elevation, thereby creating a relatively level surface.
- Plant native BLH canopy and midstory species in the sites.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

- As necessary, follow-up eradication of invasive/nuisance plant species through ground-based application of appropriate herbicides. There will likely be multiple eradication events performed during various years after construction.

3.2 PURCHASE OF SWAMP MITIGATION BANK CREDITS (SWMP1)

The feasibility study documented a sufficient number of mitigation bank credits within the Pontchartrain Basin to partially offset a portion of Project impacts to swamp habitat.

Existence of swamp mitigation bank credits was confirmed for planning purposes using data from existing in-basin banks. Specific banks were not identified. The Regulatory In lieu fee and Bank Information Tracking System (RIBITS) (http://geo.usace.army.mil/ribits/index.html) tracks data on all currently approved banks in the basin.

Before the first levee construction contract is advertised, available mitigation banks and credits will be assessed to compensate for a portion of swamp impacts. The amount of credits purchased may be more or less than currently identified in Table K-2. If more credits are available then more may be purchased. If fewer credits are available then additional plans will be developed to construct mitigation projects. Specific monitoring of mitigation success criteria following acquisition of bank credits will be conducted in accordance with the terms of the applicable Mitigation Banking Instrument.

The purchase of mitigation bank credits will be implemented by the USACE, subject to the availability of appropriations. Purchase of mitigation bank credits is deemed to be an item of total project cost and, as such, will be cost shared with the Non-Federal Sponsor in accordance with the provisions of the PPA.

3.3 BLIND RIVER SWAMP RESTORATION (SWMP2)

A project site in Livingston Parish, west of the Blind River, has been identified to plant swamp vegetation. See Figure K-2 for a map of the area and mitigation details.[12] Key parts of the restoration plan are:

[12] As noted earlier, this plan draws from an LCA report on the Amite River Diversion Canal Hydrologic Modification. A portion of the plan, involving gapping a spoil bank and an abandoned railroad embankment, is being developed by Livingston Parish. That project will improve hydrologic connection in the swamp and create favorable conditions for planting swamp trees in the mitigation area. During preconstruction engineering and design

- Verify that the Livingston Parish CIAP project was built, and that those hydraulic modifications when combined with this planting plan will produce the proposed AAHUs. If this is not verified then the details of the mitigation measure will be revised to accomplish the required mitigation.

- Plant native swamp canopy and midstory species on 1,040 acres.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

3.4 BONNET CARRÉ SWAMP RESTORATION (SWMP3)

A mitigation site for swamp habitat has been identified within the Bonnet Carré Spillway between Highway 61 and Interstate 10. The project would create 310 acres of swamp using beneficial placement of dredged material and tree plantings. Creating swamp would provide benefits to wildlife and fisheries. See Figure K-3 for a map of the area and details of the mitigation features. Dredged material would be hauled and placed in existing shallow open water areas in the spillway.

Key elements of the SWMP3 project include:

- Clear and grub woody vegetation within the sites before fill placement. This will include mechanized removal of invasive and nuisance plant species. Degrade certain existing earthen mounds and ridges within each site to the final target grade elevation. Perimeter ridges at each site will be left in place at this stage to serve as containment berms.

- Eradicate invasive/nuisance plants within the sites through ground-based application of appropriate herbicides to the target species, prior to fill placement. Follow-up eradication before the initial planting of native swamp species within these features, as necessary.

- Place fill in the mitigation sites to a final target grade elevation of approximately 1.5 to 2.0 feet NAVD88. Use fill material obtained from the Project levee right of way.[13]

- Final grading within the sites after the fill deposited in these features has settled to the desired final target elevation, prior to initial planting of the features. This grading will be performed to remove any earthen ridges that remain projecting above the target grade elevation, thereby creating a relatively level surface in the mitigation features.

- Follow-up eradication before the initial planting of native swamp species within these features, as needed. There will likely be multiple invasive/nuisance plant species eradication events during various years after the initial planting event. These may take place even beyond the attainment of the initial success criteria.

---

the USACE will assess the completed Livingston Parish project and determine if additional features are needed to support the likelihood of a successful tree planting mitigation project.

[13] This is a different borrow plan than described in the LPV PIER. This beneficial use plan takes advantage of available materials from construction of the West Shore levee. The material is a by-product of muck out construction performed before placing levee grade fill along the alignment. Material will be trucked to the site.

- Plant native swamp canopy and midstory species in the sites after final grading.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

- As necessary, follow-up eradication of invasive/nuisance plant species through ground-based application of appropriate herbicides. There will likely be multiple eradication events performed during various years after construction.

3.5 MAUREPAS CRAWFISH PONDS SWAMP RESTORATION (SWMP4)

Mitigation sites for swamp habitat have been identified at former crawfish ponds in the upper Maurepas basin. The project would restore 1,161 acres of swamp through land grading and tree plantings. See Figure K-3 for a map of the area and project details.

Key elements of the SWMP4 include:

- Clear and grub woody vegetation within the sites before grading. This will include mechanized removal of invasive and nuisance plant species.
- Degrade existing earthen mounds and levees within each site to a final target elevation approximately 1.5 to 2.0 feet NAVD88. Grading will remove former water management levees that were used to manage the crawfish ponds. Removal of these levees is intended to create a uniform elevation and to enable open exchange of water with adjacent swamps.

- Eradicate invasive/nuisance plants within the sites through ground based application of appropriate herbicides to the target species. Follow-up eradication before the initial planting of native swamp species as necessary.

- Plant 1,161 acres with native swamp canopy and midstory species after grading.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

- As necessary, follow-up eradication of invasive/nuisance plant species through ground-based application of appropriate herbicides. There will likely be multiple eradication events performed during various years after construction.

3.6 LUTCHER POLDER FARMLAND SWAMP RESTORATION (SWMP6)

A mitigation site for swamp habitat has been identified near Lutcher. The project would restore 348 acres of swamp through land grading and tree plantings. Creating swamp would provide benefits to wildlife and fisheries. See Figure K-4 for a map of the area and project details.

Key elements of the SWMP6 project include:

- Clear and grub woody vegetation within the sites before grading. This will include mechanized removal of invasive and nuisance plant species.
- Mechanically grade sites to a final target elevation approximately 1.5 to 2.0 feet NAVD88.

- Degrade existing earthen mounds and levees within each site to a final target elevation approximately 1.5 to 2.0 feet NAVD88. Grading should remove former water management levees. Removal of these levees is intended to create uniform elevation and to enable open exchange of water with adjacent swamps.
- Eradicate invasive/nuisance plants within the sites through ground based application of appropriate herbicides to the target species. Follow-up eradication before the initial planting of native swamp species as necessary.

- Plant 348 acres with native swamp canopy and midstory species.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

- As necessary, follow-up eradication of invasive/nuisance plant species through ground-based application of appropriate herbicides. There will likely be multiple eradication events performed during various years after construction.

3.8 INITIAL PLANTING OF BLH1 AND SWMP2 – SWMP6 PROJECTS

BLH Planting Design

Install BLH canopy tree species on 9-foot centers (538 seedlings per acre). The BLH Canopy species planted will follow Table K-3. The plants should consist of 60% hard mast-producing species and 40% soft mast-producing species. Site conditions (hydrologic regime, soils, composition of existing native canopy species, etc.) and plant stock availability may necessitate deviations from the species lists or the percent composition. Any deviations would first be approved by the USACE and Non-Federal Sponsor (NFS).

Install midstory species on 18-foot centers (134 seedlings per acre). Midstory species planted will follow Table K-4. The species used and the proportion of the total midstory species percent composition may vary depending on site conditions (composition and frequency of existing native midstory species, hydrologic regime, soils, etc.) and available stock. Deviations would first be approved by the USACE in coordination with agencies and NFS.

The following guidelines apply to all BLH planting stock for use at mitigation sites:

- Trees will be at least a year old and 2 feet tall.

- Trees will have a minimum root collar diameter of 3/8 inch and a root length of at least 8-10 inches with 4-8 lateral roots.

- Stock must be from a registered licensed regional nursery/grower and of a regional eco-type species properly stored and handled to ensure viability.

- Install plants from December through March 15 (planting season/dormant season).

- Planting will avoid monotypic rows (goal is to have spatial diversity).

- Protection devices such as wire-mesh fencing or plastic seedling protectors will be installed around each seedling to help minimize herbivory.

Table K-3. Plant List for Native Canopy Species - BLH.[14]

Common Name	Scientific name	Percent Composition
Hard Mast-Producing Canopy Species (60% of Total Canopy Plants Installed)		
Nuttall oak	*Quercus nuttalli, Q. texana*	40%
Willow oak	*Quercus phellos*	30%
Water oak	*Quercus nigra*	10%
Overcup oak	*Quercus lyrata*	10%
Water hickory	*Carya aquatica*	10%
Soft Mast-Producing Canopy Species (40% of Total Canopy Plants Installed)		
Drummond red maple	*Acer rubrum* var. *drummondii*	20%
Sugarberry	*Celtis laevigata*	20%
Green ash	*Fraxinus pennsylvanica*	20%
American elm	*Ulmus americana*	20%
Common persimmon	*Diosypros virginiana*	10%
Bald cypress	*Taxodium distichum*	10%

Table K-4. Plant List for Native Midstory Species - BLH.

Common Name	Scientific name	Percent Composition
Saltbush	*Baccharis halimifolia*	10%
Buttonbush	*Cephalanthus occidentalis*	10%
Mayhaw	*Crataegus opaca*	20%
Green hawthorn	*Crataegus viridis*	20%
Possumhaw	*Ilex decidua*	10%
Dahoon holly	*Ilex cassine*	10%
Wax myrtle	*Myrica cerifera, Morella cerifera*	20%

Swamp Planting Design

Install swamp canopy tree species on 9-foot centers (538 seedlings per acre). The swamp canopy species planted will follow Table K-5. Site conditions (hydrology, soils, composition of native canopy species, etc.) and plant stock availability may necessitate deviations from the species lists or the percent composition. Any deviations would first be approved by the USACE and NFS.

Install midstory species on 18-foot centers (134 seedlings per acre). Midstory species planted will follow Table K-6. The species used and the proportion of the total midstory plantings

[14] Percent composition values indicated represent the percentage of the total plants installed for each category.

species percent composition may vary depending on site conditions (composition and frequency of existing native midstory species, hydrologic regime, soils, etc.) and available stock. Deviations would first be approved by the USACE in coordination with agencies and NFS. The following guidelines apply to all planting stock for use at swamp mitigation sites:

- Trees will be at least a year old and 3 feet tall.
- Trees will have a minimum root collar diameter of 3/8 inch and a root length of at least 8-10 inches with 4-8 lateral roots.
- Stock must be from a registered licensed regional nursery/grower and of a regional eco-type species properly stored and handled to ensure viability.

- Install plants from December through March 15 (planting season/dormant season).

- Planting will avoid monotypic rows (goal is to have spatial diversity).

- Protection devices such as wire-mesh fencing or plastic seedling protectors will be installed around each seedling to help minimize herbivory.

Table K-5. Plant List for Native Canopy Species - Swamp.[15]

Common Name	Scientific name	Percent Composition
Bald cypress	*Taxodium distichum*	55%
Tupelogum	*Nyssa aquatica*	20%
Green ash	*Fraxinus pennsylvanica*	10%
Bitter pecan	*Carya x lecontei*	10%
Drummond red maple	*Acer rubrum* var. *drummondii*	5%

Table K-6. Plant List for Native Midstory Species - Swamp.

Common Name	Scientific name	Percent Composition
Buttonbush	*Cephalanthus occidentalis*	50%
Swamp privet	*Forestiera acuminata*	20%
Possumhaw	*Ilex decidua*	10%
Wax myrtle	*Myrica cerifera, Morella cerifera*	10%
American snowbell	*Styrax americanus*	10%

4. MITIGATION MANAGEMENT PLAN

This section generally describes the management activities for all of the mitigation projects excluding the purchase of mitigation bank credits. The primary management activity is the short-term and long-term eradication and control of invasive and nuisance plants. The potential for replanting trees to meet initial success criteria are highlighted as well. Other activities may include thinning trees and vegetation to manage timber stands for optimal ecological benefit.

[15] Percent composition values indicated represent the percentage of the total plants installed for each category.

Table 7 provides a generic overview of the potential activities. Specific schedules for each project will be fully developed during preconstruction engineering and design.

Table K-7: Overview of Mitigation Management Activities.		
Estimated Year	**Activity**	**Responsible Party**
0	Construction – initial eradication of invasive/nuisance species	USACE
0	Construction – pre-planting eradication	USACE
0	Construction – post-planting eradication	USACE
1	Initial success period – two eradication events	USACE
2	Initial success period – two eradication events	USACE
3	Initial success period – two eradication events	USACE
4	Initial success period – one eradication event	USACE
1-4	Potential replanting if initial success criteria are not met	USACE
5	Intermediate success period – one eradication event	NFS
9	Intermediate success period – one eradication event	NFS
13	Intermediate success period – one eradication event	NFS
17	Intermediate success period – one eradication event	NFS
15-20	Potential Timber Management	NFS
21	Intermediate success period – one eradication event	NFS
25	Long-Term success period – one eradication event	NFS
30	Long-Term success period – one eradication event	NFS
35	Long-Term success period – one eradication event	NFS
40	Long-Term success period – one eradication event	NFS
45	Long-Term success period – one eradication event	NFS
50	Long-Term success period – one eradication event	NFS

Invasive and Nuisance Plant Eradication

The actual frequency of invasive/nuisance plant eradication events will vary by mitigation site. The frequency and intensity of these events will be determined based on the degree of invasive/nuisance plant infestation observed during monitoring and inspections. The methods used to eradicate invasive and nuisance plant species will vary by site and time period. Mechanized clearing and removal may be used before the initial plantings, using equipment such as hydro-axes, gyro-tracs, bulldozers, etc. Hand-held equipment such as chain saws and machetes may be used. It is doubtful that mechanized clearing/removal of invasive/nuisance plants will be employed once the initial plantings occur. Instead, invasive/nuisance plants will be eradicated using ground-based applications of appropriate herbicides to the target plants. The specific equipment (e.g. backpack sprayers, hand application, hypo-hatchet, tube-injector, ATVs with boom sprayers, etc.) and methods (e.g. cut stump treatment, basal bark application, hack and squirt, etc.) used to apply the herbicides will be determined by the contractor.

Ground-based applications of herbicides would also be employed to treat any stumps or other above-ground portions of invasive/nuisance plants remaining after mechanized clearing and removal. Ground-based herbicide applications will typically occur during the early part of the growing season in cases where there will be one or two events during a year, and will typically

occur again during the latter part of the growing season in cases where there will be two application events in a year.

Vegetation Re-Planting

Short-term management activities may include re-planting events after the initial planting of native canopy and midstory species. It was assumed that these events, involving the re-planting of approximately 20% of the total number of canopy species and 20% of the total number of midstory species installed, may be needed to satisfy native vegetation success criterion 2.B (see Section 6). If the initial success criterion is satisfied re-planting will not occur. The USACE will be responsible for performing the re-planting events discussed above, including provision of the necessary plants. The cost of this re-planting will be shared with the Non-Federal Sponsor. The NFS after the initial success criterion are met will be responsible for any subsequent re-plantings required to meet mitigation success criteria and the cost for such re-plantings will be borne solely by the NFS.

Timber Management

After meeting the initial planting success criteria, it may be determined that the density of living native canopy species and/or living native midstory species are excessive in one or more of the mitigation sites. This determination would be made by the USACE and NFS in coordination with resource agencies 15 to 20 years after the initial plantings based on site monitoring.

If it is decided that timber management efforts are necessary, the NFS will develop a Timber Stand Improvement/Timber Management Plan, and associated long-term success criteria, in coordination with the USACE and agencies. Following approval of the plan by USACE, the NFS will perform the necessary thinning operations and demonstrate these operations have been successfully completed. Timber management activities will only be allowed for the purposes of ecological enhancement of the mitigation site.

5. LAND ACQUISITION & PRESERVATION OF MITIGATION FEATURES

The land in the Bonnet Carré spillway encompassing the proposed mitigation features themselves, as well as the land areas required for mitigation construction access and future mitigation maintenance/management access is owned by the Federal government (i.e. USACE). NFS will be responsible for OMRR&R of the mitigation features which lie within the Bonnet Carré Spillway. The Government will provide an outgrant to perform OMRR&R of the mitigation site.

The NFS will be required to preserve and protect the mitigation features in perpetuity. This requirement will be assured via the Project Partnership Agreement (PPA) between the USACE and the NFS, as well as through appropriate language in the Operations, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) manual prepared for this project by USACE and provided to the NFS.

Various lands must be acquired for the Blind River mitigation features, for areas required for construction access, borrow sites, and for future mitigation maintenance/management access. Properties will be acquired by the NFS or by the Government for the NFS.

Required properties could be privately owned or owned by a government agency. In areas that are owned by a government agency other than the USACE, the NFS will sign an interagency agreement allowing the USACE to build mitigation features. Areas that are privately owned will be acquired in accordance with the requirements of Public Law 91-646. Each property to be acquired will be appraised and the owner will be offered the market value of property. Owners will be given an opportunity to negotiate the property sale prices. If the Non-Federal Sponsor and the owner are not able to come to an amicable agreement on price or if the title of the property is not clear, the acquisition will be completed through the expropriation process.

The NFS will acquire fee over the sites (other than the Government-owned Bonnet Carré Spillway). Depending on the ownership size and the mitigation feature to be acquired, the owner may be able to explore and develop minerals through directional drilling. In the development of the appraisal, the appraiser will consider the impact of the acquisition on the remaining property. In some instances, mineral rights may need to be subordinated. Until the final boundaries of the features are identified and ownership search is conducted, this cannot be determined.

Access routes to the features as well as areas for equipment/contractor staging will be acquired by the NFS as temporary work area easements. The same could be true for certain borrow sites. Such easements allow the Government the exclusive use of the property for a specified duration. These areas would be appraised and the owner would negotiate with the NFS the sale price.

All real estate acquisition will be accomplished in the name of the Non-Federal Sponsor. The NFS will grant the USACE right of entry to perform work. Features, with the exception of the Bonnet Carré Spillway, will remain in the ownership of the NFS who will be responsible for operation and maintenance. Temporary use sites will revert to owners after easements expire.

6. MITIGATION SUCCESS CRITERIA

Mitigation success criteria have been identified for the mitigation construction projects (BLH1, SWMP2, SWMP3, SWMP4, and SWMP6). These criteria do not apply to any credits purchased from mitigation banks because the banks are subject to meeting the requirements of specific mitigation banking instruments.

The specific criteria information is presented chronologically in Table K-8 along with the designation of the responsible party for each activity. After the table the success criteria are displayed by category and point in time beginning with mitigation project construction.

Construction periods will vary by project depending upon the required activity and the size of the project. Smaller projects with fewer construction elements will be constructed faster than longer more involved projects. All construction activity is currently described as year zero. All other success criteria are linked to years beginning at year one which is designated as one growing

season after completing the initial planting. Specific criteria and schedules will be developed for each project site during preconstruction engineering and design.

Modifications to mitigation success criteria could become necessary for various reasons. Proposed modifications to any success criteria must first be approved in writing by the USACE after coordination with the IET and NFS.

Table K-8: Overview of Mitigation Success Criteria.

Year	Activity	Success Criteria			Responsible Party
		Initial	Intermediate	Long-Term	
0	Construction – site prep.	x			USACE
0	Construction – site filling.[16]	x			USACE
0	Construction – eradicate invasive and nuisance species.	x			USACE
0	Construction – plantings.	x			USACE
0	Construction – site final work.	x			USACE
1	Minimum average survival of 50% of planted canopy species.	x			USACE
1	Minimum average survival of 85% of planted midstory species.	x			USACE
1	Demonstrate that 85% of the total area in swamp projects (BLH1, SWMP3-6) is within 0.5 feet of the target surface elevation.	x			USACE
4	Minimum average density of 300 living native canopy species per acre in swamp sites		x		NFS
4	Density of 120-150 living native hard-mast producing species per acre in BLH1.		x		NFS
4	Achieve a minimum average density of 85 living native midstory species per acre (planted midstory and/or naturally recruited native midstory species) in BLH1.		x		NFS
4	Demonstrate that vegetation satisfies USACE hydrophytic vegetation criteria.		x	x	NFS
4	In a year having essentially normal rainfall, demonstrate that the water table is less than or equal to 12 inches below the soil surface for a period of at least 14 consecutive days.		x		NFS
10	Attain a minimum average cover of 80% by planted canopy species and/or naturally recruited native canopy species.		x	x	NFS
10	In a year having essentially normal rainfall, demonstrate that the mitigation features are irregularly inundated or soils are saturated to the soil surface for a period ranging from 7% to 13% of the growing season.			x	NFS

[16] If needed.

Table K-8: Overview of Mitigation Success Criteria.					
Year	**Activity**	**Success Criteria**			**Responsible**
15	Achieve a minimum average density of 75 living native plants per acre in the midstory stratum (planted midstory and/or naturally recruited native midstory species).		x		NFS
15-20	If necessary, develop a Timber Management Plan, and associated long-term success criteria.			x	NFS
25	Average cover by native species in the midstory stratum 20% - 50%.			x	NFS
25	Average cover by native species in the understory stratum (ground cover stratum) 30% - 60%.			x	NFS
1-50	Maintain areas to be essentially free of invasive and nuisance plant species immediately following all eradication events. Assure that the total average vegetative cover accounted for by invasive and nuisance species each constitute less than 5% of the total average plant cover during periods between maintenance events.	x	x	x	USACE until initial success criteria are satisfied. NFS after initial success criteria are satisfied.

The mitigation plan ecological success criteria are described in the following sub-sections. The criteria apply to all USACE constructed mitigation projects in this plan except as noted.

1. General Construction

A. Complete all necessary initial clearing, grubbing, earthwork, grading, and related construction in accordance with the mitigation work plan and in accordance with final project plans and specifications. This requirement classifies as an initial success criterion.

2. Native Vegetation

A. Complete initial planting of canopy and midstory species in accordance with Section 3.8. This requirement classifies as an initial success criterion.

B. One Year After Completing Initial Plantings (at end of first growing season following the year plants are first installed).

- Achieve a minimum average survival of 50% of planted canopy species. The surviving plants must approximate the species composition and the species percentages specified in the planting designs. These criteria apply to the initial plantings as well as any subsequent re-plantings necessary to achieve the initial success criteria.

- Achieve a minimum average survival of 85% of planted midstory species. The surviving plants must approximate the species composition percentages specified in the planting

designs. These criteria will apply to the initial plantings as well as any subsequent re-plantings necessary to achieve this initial success requirement.

C. Four Years After Completing Initial Plantings.

- Achieve a minimum average density of 300 living native canopy species per acre (planted trees and/or naturally recruited native species). These classify as intermediate success criteria.

- Achieve a minimum average density of 120 living, native, hard mast-producing species in the canopy stratum but no more than approximately 150 living hard-mast producing species in the canopy stratum (planted trees and/or naturally recruited native canopy species). The remaining trees in the canopy stratum must be comprised of soft mast-producing native species. These criteria will thereafter remain in effect for the duration of the overall monitoring period.

- Achieve a minimum average density of 85 living native midstory species per acre (planted midstory and/or naturally recruited native midstory species).
- Demonstrate that vegetation satisfies USACE hydrophytic vegetation criteria. This requirement will thereafter remain in effect for the duration of the overall monitoring period.

D. Within 10 Years After Completing Initial Plantings.

- Attain a minimum average cover of 80% by planted canopy species and/or naturally recruited native canopy species. This criterion will thereafter remain in effect for the duration of the overall monitoring period. This requirement to meet the specified minimum average cover within 10 years following completion of initial plantings classifies as an intermediate success criterion. The requirement to meet the specified minimum average cover for the duration of the overall monitoring period classifies as a long-term success criterion.

E. 15 Years After Completing Initial Plantings.

- Achieve a minimum average density of 75 living native plants per acre in the midstory stratum (planted midstory and/or naturally recruited native midstory species). This requirement classifies as an intermediate success criterion.

F. 25 Years After Completing Initial Plantings.

- Average cover by native species in the midstory stratum must be greater than 20% but cannot exceed 50%. This criterion will apply for the duration of the overall monitoring period.[17]

- Average cover by native species in the understory stratum (ground cover stratum) must be greater than 30% but cannot exceed 60%. This criterion will thereafter remain in effect for the duration of the overall monitoring period.

- The requirements above classify as long-term success criteria.

[17] The requirement that criteria remain in effect for the duration of the overall monitoring period may need to be modified due to factors such as the effect of sea level rise on vegetative cover. Proposed modifications must first be approved by the USACE in coordination with the NFS and agencies.

3. Invasive and Nuisance Vegetation

A. Complete the initial eradication of invasive and nuisance plant species. This requirement classifies as an initial success criterion.

B. Maintain all areas such that they are essentially free from invasive and nuisance plant species immediately following eradication events. Ensure that the total average vegetative cover accounted for by invasive and nuisance species each constitute less than 5% of the total average plant cover during periods between eradication events. This requirement classifies as an initial success criterion.

C. Maintain all areas such that they are essentially free from invasive and nuisance plant species immediately following eradication events. Ensure that the total average vegetative cover accounted for by invasive and nuisance species each constitute less than 5% of the total average plant cover during periods between eradication events. This requirement classifies as an intermediate and long-term success criterion.

4. Topography[18] (applies only to BLH1, SWMP3, SWMP4, and SWMP6)

A. In the year after initial construction activities are completed (i.e. year following completion of initial clearing, grubbing, and fill placement); demonstrate that at least 85% of the total area within each feature is within approximately 0.5 feet of the proposed target surface elevation. This requirement classifies as an initial success criterion.

5. Hydrology[19] (applies only to, SWMP3, SWMP4, and SWMP6)

A. In a year having essentially normal rainfall, demonstrate that the water table is less than or equal to 12 inches below the soil surface for a period of at least 14 consecutive days. This requirement classifies as an intermediate success criterion.

B. In a year having essentially normal rainfall, demonstrate that the mitigation features are irregularly inundated or soils are saturated to the soil surface for a period ranging from 7% to approximately 13% of the growing season. Note that this success criterion is more of a goal than it is a specific criterion; hence, some latitude is allowed as regards attaining this criterion, which classifies as a long-term success criterion.

7. MONITORING AND REPORTING

[18] There is no expectation that repair, rehabilitation and replacement would be needed on the surface elevation therefore there is no intermediate or long term success criteria. If a situation occurs after FNCC, other than from RSLR, where the topography changes and the initial success criteria is no longer met, the NFS is responsible for the repair, rehabilitation, and replacement of the topographic features and the cost will be entirely borne by the non-Federal Sponsor.

[19] There is no initial success criterion for hydrology because the timing of the monitoring can only occur during an essentially normal rainfall year. This criterion will not be used in the determination of FNCC.

7.1 STANDARD MITIGATION MONITORING AND REPORTING

7.1.1 "Time Zero" Monitoring Report (Monitoring Report #1)

Shortly after completing all initial mitigation construction activities (e.g. initial eradication of invasive and nuisance plants, initial vegetation planting, completion of initial earthwork, grading, etc.), the mitigation site will be monitored and a "time zero" or "baseline" monitoring report prepared. Information provided will include the following items from all project sites:

- A detailed discussion of all mitigation activities completed.
- A description of the various features and habitats within the mitigation site.
- A plan view drawing of the mitigation site showing the approximate boundaries of the different mitigation features, monitoring transect locations, sampling plot locations, photo station locations, and piezometer and staff gage locations.
- An as-built survey of finished grades in the mitigation features, along with an assessment of whether the topography success criterion has been satisfied. The topographic as-built survey may be conducted using LiDAR or conventional ground-survey methods. Note that this topographic survey would be performed prior to the initial planting of mitigation features and would be evaluated by the USACE prior to installing plants. If this evaluation indicates the topography success criterion has been achieved, then plants would be installed. However, if the evaluation indicates success has not been achieved, supplemental topographic alterations would be performed by the USACE, a second as-built topographic survey of the affected areas would be conducted after completing of the supplemental topographic alterations, and plants would not be installed until the topography success criterion is achieved. Should this scenario arise, the time-zero monitoring report would not be submitted until the year plants are installed.
- A detailed inventory of all canopy and midstory species planted, including the number and size of each. In addition, provide a breakdown itemization indicating the number of each species planted in each separate mitigation feature within the mitigation site and correlate this itemization to the various areas depicted on the plan view drawing of the mitigation site.

7.1.2 Additional Monitoring Reports

All monitoring reports generated after the initial "time zero" report will provide the following information unless otherwise noted:

- A plan view drawing of the mitigation site showing the approximate boundaries of the different mitigation features, monitoring transect locations, sampling plot locations, photo station locations, and piezometer and staff gage locations.
- A brief description of maintenance and/or management and/or mitigation work since the previous monitoring report along with a discussion of any other significant occurrences.

- Photos documenting site conditions at the time of monitoring. Photos will be taken at permanent stations in each site. Two photos will be taken at each station with the view of each always oriented in the same general direction from one monitoring event to the next.

  The estimated number of permanent photo stations in each mitigation feature is provided below (complete details will be prepared in preconstruction engineering and design):

  Bonnet Carré Bottomland Hardwood (BLH1)
  - BLH feature BC28 = 3 photo stations.
  - BLH feature BC29 = 3 photo stations.
  - BLH feature BC30 = 5 photo stations.
  - BLH feature BC31 = 3 photo stations.

  Blind River Swamp (SWMP2)
  - Blind River Swamp feature 1 = 6 photo stations.
  - Blind River Swamp feature 2 = 12 photo stations.

  Bonnet Carré Swamp (SWMP3)
  - Swamp feature BC24 = 12 photo stations.
  - Swamp feature BC25 = 6 photo stations.
  - Swamp feature BC26 = 7 photo stations.
  - Swamp feature BC27 = 4 photo stations.

  Maurepas Crawfish Ponds (SWMP4)
  - Maurepas Crawfish Ponds = 12 photo stations.

  Lutcher Polder Swamp (SWMP6)
  - Lutcher Polder Swamp = 18 photo stations.

- Quantitative plant data from permanent monitoring plots in the Bonnet Carré Bottomland Hardwood mitigation site measuring 90 feet X 90 feet in size. Data recorded in each plot will include: number of living planted canopy species present and the species composition; number of living planted midstory species present and the species composition; average density of all native species in the canopy stratum, the total number of each species present, and, for BLH restoration features only, the wetland indicator status of each species; average percent cover by native species in the canopy stratum; average density of all native species in the midstory stratum, the total number of each species present, and, for BLH restoration features only, the wetland indicator status of each species; average percent cover by native species in the midstory stratum; average percent cover accounted for by invasive plant species (all vegetative strata combined); average percent cover accounted for by nuisance plant species (all vegetative strata combined).

  The number of permanent monitoring plots in each BLHH mitigation site will be as follows:

  Bonnet Carré Bottomland Hardwood (BLH1)
  - BLH feature BC28 = 1 plot.

- BLH feature BC29 = 2 plots.
- BLH feature BC30 = 3 plots.
- BLH feature BC31 = 1 plot.

- Quantitative plant data collected from permanent monitoring plots in the swamp sites measuring approximately 80 feet X 80 feet in size. Data recorded in each plot will include: number of living planted canopy species present and the species composition; number of living planted midstory species present and the species composition; average density of all native species in the canopy stratum, the total number of each species present, and the wetland indicator status of each species; average percent cover by native species in the canopy stratum; average density of all native species in the midstory stratum, the total number of each species present, and the wetland indicator status of each species; average percent cover by native species in the midstory stratum; average percent cover accounted for by invasive plant species (all vegetative strata combined); average percent cover accounted for by nuisance plant species (all vegetative strata combined). In addition to these data, the following information will be recorded for native tree species in the canopy stratum: the average diameter at breast height (DBH; expressed in inches) of bald cypress trees; average DBH of all other native tree species excluding bald cypress; the average total basal area of living native trees (expressed in square feet per acre). The DBH of planted canopy species will not need to be documented until the average DBH of these trees reaches two inches. Total basal area data will also not need to be documented until such time that the average total basal area is estimated to exceed approximately 100 square feet per acre. The number of permanent monitoring plots in each swamp mitigation site will vary based upon project size. A standard of one plot for every 50 acres should be used.

- Quantitative plant data collected from permanent transects sampled using the point-centered quarter method with sampling points established at approximately 100-foot intervals along the course of each transect. Data recorded from the sampling transects will include: average density of living planted canopy species present and the species composition; average density of living planted midstory species present and the species composition; average density of all native species in the canopy stratum along with the species composition and the wetland indicator status of each species; average percent cover by all native species in the canopy stratum; average density of native species in the midstory stratum and the total number of each species present, and the wetland indicator status of each species; average percent cover by native species in the midstory stratum; average height of native species in the midstory stratum; if present, average percent cover accounted for by invasive and nuisance species present in the canopy and midstory strata (combined).

  The number of permanent transects and sampling points along each transect for each mitigation feature will be as follows:

  <u>Bonnet Carré Bottomland Hardwood (BLH1)</u>
  - BLH feature BC28 = 1 transect with 20 sampling points.
  - BLH feature BC29 = 1 transect with 20 sampling points.
  - BLH feature BC30 = 1 transect with 27 sampling points.
  - BLH feature BC31 = 1 transect with 20 sampling points.

Blind River Swamp (SWMP2)

- 5 transects, each with 20 sampling points.

Bonnet Carré Swamp (SWMP3)

- Swamp feature BC24 = 1 transect with 20 sampling points, 1 transect with 21 sampling points, and 1 transect with 28 sampling points.
- Swamp feature BC25 = 2 transects, each with 20 sampling points.
- Swamp feature BC26 = 2 transects, each with 20 sampling points.
- Swamp feature BC27 = 1 transect with 30 sampling points.

Maurepas Crawfish Ponds (SWMP4)

- 6 transects with 20 sampling points.

Lutcher Polder Swamp (SWMP6)

- 7 transect with 20 sampling points.

- Quantitative data concerning plants in the understory (ground cover) will be gathered from sampling quadrats. These quadrats will be established at each of the sampling points established along the point-centered quarter transects discussed above. Each quadrat will be approximately 6.5 feet X 6.5 feet in size. Data recorded from the sampling quadrats will include: average percent cover by native understory species; composition of native understory species and the wetland indicator status of each species; average percent cover by invasive plant species; average percent cover by nuisance plant species.

The number of sampling quadrats for each mitigation feature will be as follows:

Bonnet Carré Bottomland Hardwood (BLH1)

- BLH feature BC28 = 20 quadrats.
- BLH feature BC29 = 20 quadrats.
- BLH feature BC30 = 27 quadrats.
- BLH feature BC31 = 20 quadrats.

Blind River Swamp (SWMP2)

- 75 quadrats.

Bonnet Carré Swamp (SWMP3)

- Swamp feature BC24 = 49 quadrats.
- Swamp feature BC25 = 40 quadrats.
- Swamp feature BC26 = 40 quadrats.
- Swamp feature BC27 = 30 quadrats.

Maurepas Crawfish Ponds (SWMP4)

- 100 quadrats

Lutcher Polder Farmlands (SWMP6)

- 140 quadrats

- A summary of rainfall data collected during the year preceding the monitoring report based on rainfall data recorded at a station located on or in close proximity to each mitigation site. Collecting and reporting of rainfall data will end once all hydrology success criteria are met.

- A summary of water table elevation data collected from piezometers, possibly coupled with staff gages, installed within the mitigation features. Data (water table elevations) will be collected at least bi-weekly. Once the monitoring indicates the water table may be rising to an elevation that would meet hydrologic success criteria, water table elevations will be collected on a daily basis until it is evident the success criteria has been satisfied. The schedule of water table elevation readings can shift back to a bi-weekly basis for the remainder of the monitoring period. Once hydrology success criteria have been satisfied, water table monitoring will no longer be required. However, monitoring reports generated subsequent to the attainment of success criteria will include a general discussion of water levels and hydroperiod based on qualitative observations.

  The number of piezometers in each mitigation feature will be as follows:

Bonnet Carré Bottomland Hardwood (BLH1)

- BLH feature BC28 = 2 piezometers.
- BLH feature BC29 = 3 piezometers.
- BLH feature BC30 = 4 piezometers.
- BLH feature BC31 = 2 piezometers.

Blind River Swamp (SWMP2)

- Blind River Swamp feature SE1 = 2 piezometers.
- Blind River Swamp feature SE2 = 3 piezometers.

Bonnet Carré Swamp (SWMP3)

- Swamp feature BC24 = 8 piezometers.
- Swamp feature BC25 = 4 piezometers.
- Swamp feature BC26 = 4 piezometers.
- Swamp feature BC27 = 3 piezometers.

Maurepas Crawfish Ponds (SWMP4)

- 8 piezometers.

Lutcher Polder Farmlands (SWMP6)

- 7 piezometers.

- Various qualitative observations will be made in the site to help assess the status and success of mitigation and maintenance activities. These observations will include: general estimates of the average percent cover by native plant species in the canopy, midstory, and understory

strata; general estimates of the average height of planted canopy and midstory species; general estimates of the average percent cover by invasive and nuisance plant species; general estimates concerning the growth of planted canopy and midstory species; general observations concerning the colonization by volunteer native plant species. General observations made during the course of monitoring will also address potential problem zones, general condition of native vegetation, trends in the composition of the plant communities, wildlife utilization as observed during monitoring, and other pertinent factors.

- A summary assessment of all data and observations along with recommendations for actions to help meet mitigation and management/maintenance goals and mitigation success criteria.

- A brief description of anticipated maintenance/management work to be conducted during the period from the current monitoring report to the next monitoring report.

7.1.3 Monitoring Reports Following Re-Planting Activities

Re-planting of certain areas within the mitigation features may be necessary to ensure attainment of applicable native vegetation success criteria. Any monitoring report submitted following completion of a re-planting event must include an inventory of the number of each species planted and the stock size used. It must also include a depiction of the areas re-planted, cross-referenced to a listing of the species and number of each species planted in each area.

7.1.4 Monitoring Reports Involving Timber Management Activities

Where timber management activities (thinning of trees and/or shrubs in the canopy and/or midstory strata) have been approved by the USACE in coordination with the IET, monitoring will be required in the year immediately preceding and in the year following completion of the timber management activities (i.e. pre-timber management and post-timber management reports). These reports must include data and information that are in addition to the typical monitoring requirements. The Non-Federal Sponsor's proposed Timber Stand Improvement/Timber Management Plan must include the proposed monitoring data and information that will be included in the pre-timber management and post-timber management monitoring reports. The proposed monitoring plan must be approved by the USACE in coordination with the IET prior to the monitoring events and implementation of the timber management activities.

7.2 DISTRICT CONSULTATION REPORTS & USACE CIVIL WORKS PROJECT MITIGATION DATABASE REPORTS

Section 2036(a) of WRDA 2007 requires the USACE to conduct annual consultation with appropriate Federal and State agencies to assess the success of mitigation plans and to prepare annual reports summarizing consultation results. To satisfy these requirements, annual District Consultation Reports will be prepared and submitted to the USACE Mississippi Valley Division. Each report will provide the following information:

- List of the types of mitigation implemented.
- Describe the mitigation; include acres implemented and any acres remaining.
- Describe the consultation process (steps to consult with Federal and State agencies).

- Discuss consultation status, the agencies involved and the outcome. If consultation is complete, describe the outcome as one of the following: no action needed; no response from Federal or state agencies on consultation; on schedule with no adaptive management implemented due to consultation, or on schedule with adaptive management implemented due to consultation; behind schedule with adaptive management implemented due to consultation, or; behind schedule for reasons not related to consultation.
- Discuss the outcome of consultation (if completed) to include: an assessment of the likelihood that the mitigation will achieve the success criteria specified in the mitigation plan (copy of plan provided); the projected timeline for achieving mitigation success, and; any recommendations for improving the likelihood of success.

Mitigation data and information will be entered into the USACE Civil Works Project Mitigation Database annually. The database specifies the required data and information.

7.3 MITIGATION MONITORING & REPORTING SCHEDULE AND RESPONSIBILITIES: STANDARD MONITORING AND REPORTING

Monitoring work will typically take place in late summer, but may be delayed until later in the growing season due to site conditions or other circumstances. Monitoring reports will be submitted by December 31 of each year of monitoring. Monitoring reports will be provided to the USACE, the NFS, and the agencies comprising the IET.

Table K-9 indicates the currently anticipated monitoring report schedule and the party responsible for conducting the monitoring and preparing the report. Specific schedules will be developed for each project site during preconstruction engineering and design.

Table K-9. Standard mitigation monitoring report schedule and monitoring responsibility.

Year	Monitoring Report Number	Party Responsible for Monitoring and Reporting
0 (start of construction – baseline monitoring)	N/A	N/A
0 (completion of initial construction activities)	N/A	N/A
0 (complete final earthwork construction; fill areas at target grade)	N/A	N/A
0 (Complete the initial eradication of invasive and nuisance plant species.)	1 (Time Zero Report)	USACE
0 (complete initial plantings early in year; complete construction)	1 (Time Zero Report)	USACE
1 (Maintain all areas such that they are essentially free from invasive and nuisance plant species)	2	USACE
1 year after initial plantings	2	USACE
1-4 (re-planting, if necessary)	2A*	USACE*
6	2B*	USACE*
7	3	NFS
10	4	NFS
15	5	NFS
20	6	NFS

Table K-9. Standard mitigation monitoring report schedule and monitoring responsibility.		
Year	**Monitoring Report Number**	**Party Responsible for Monitoring and Reporting**
25	7	NFS
30	8	NFS
35	9	NFS
40	10	NFS
45	11	NFS
50	12	NFS
*Reports 2A and 2B would be produced only if re-planting is needed as determined by monitoring report #2.		

The USACE will be responsible for conducting the monitoring events and preparing the associated monitoring reports until such time that the following initial success criteria are achieved (criteria follow numbering system used in success criteria section):

1. General Construction – A.
2. Native Vegetation – A and B.
3. Invasive & Nuisance Vegetation – A and B
4. Topography – A.

Monitoring events associated with the above will include the "time zero" (first or baseline) monitoring event plus annual monitoring events thereafter until the mitigation monitoring responsibility is transferred to the NFS. The Non-Federal Sponsor will be responsible for conducting the required monitoring events and preparing the associated monitoring reports after the USACE has demonstrated the initial success criteria listed above have been achieved.

Once monitoring responsibilities are transferred to the NFS, the next monitoring event will take place during the year that attainment of success criterion 2.C (native vegetation criterion applicable 4 years after completion of initial plantings) must be demonstrated. Thereafter, monitoring will typically be conducted every 5 years throughout the 50-year period of analysis.

If the initial success criteria for planted species are not achieved (i.e. the 1-year survival criteria specified in native vegetation success criterion 2.B), a monitoring report will be required for each consecutive year until two annual sequential reports indicate that all survival criteria have been met (i.e. that corrective actions were successful). The USACE will be responsible for conducting this additional monitoring and preparing the monitoring reports. The USACE will be responsible for the purchase and installation of supplemental plants needed to attain this success criterion.

If the native vegetation success criteria specified for 4 years following completion of initial plantings are not achieved (i.e. native vegetation success criteria 2.C), a monitoring report will be required for each consecutive year until two annual sequential reports indicate that these criteria have been satisfied. The NFS will be responsible for conducting this additional monitoring and preparing the monitoring reports. The NFS will also be responsible for the purchase and installation of supplemental plants needed to attain these success criteria.

If timber management activities are conducted by the NFS in the mitigation features, the NFS will be responsible for conducting the additional monitoring and preparing the associated monitoring reports necessary for such activities (e.g. one monitoring event and report in the year immediately preceding timber management activities and one monitoring event and report in the year that timber management activities are completed).

Monitoring reports 2A and 2B in Table K-7 will only be necessary if the second monitoring report indicates that native vegetation success criterion #2.B has not been achieved, thereby requiring re-planting in Year #5. If re-planting is not necessary, there would be no monitoring in years 5 and 6. It is assumed that some re-planting will be needed. The schedule provided in the table does not account for the need to physically adjust topography once final construction activities have been completed. Should adjustments be necessary to achieve topographic success criteria, then the monitoring schedule presented would likely require adjustments.

Although the USACE will be responsible for conducting the work for monitoring reports 1, 2, 2A, and 2B and will be responsible for preparing these reports, the costs for these activities will be cost shared with the NFS. The costs associated with conducting the monitoring and preparing monitoring reports for all subsequent monitoring reports will be solely borne by the NFS.

It is not feasible at this time to accurately estimate the actual calendar year when mitigation construction activities will be initiated. This explains why the years indicated in the preceding table are not actual calendar years. This mitigation plan will be revised in PED to include a monitoring / reporting schedule using calendar years.

Once monitoring responsibilities have transferred to the NFS, the NFS will retain the ability to modify the monitoring plan and the monitoring schedule if necessary due to unforeseen events or to improve the information provided through monitoring. Twenty years following completion of initial plantings, the number of monitoring plots and/or monitoring transects that must be sampled during monitoring events may be reduced substantially if it is clear that mitigation success is proceeding as anticipated. Any significant modifications to the monitoring plan or the monitoring schedule must first be approved in writing by the USACE. Changes will be coordinated in advance with the IET.

7.4 MITIGATION MONITORING & REPORTING SCHEDULE AND RESPONSIBILITIES: DISTRICT CONSULTATION REPORTS AND USACE CIVIL WORKS PROJECT MITIGATION DATABASE REPORTS

The USACE is responsible for preparing and submitting all District Consultation Reports. These reports will be submitted annually beginning in the year the mitigation construction begins and continuing throughout the 50-year period of analysis. The date for submittal of each report will be in accordance with guidance provided by MVD and/or USACE Headquarters. Presently, guidance requires annual reports be submitted 14 working days before October 1st.

The agencies involved in the consultation process will include, at a minimum: USACE, Mississippi Valley Division, New Orleans District; the Non-Federal Sponsor; US Fish and Wildlife Service; Louisiana Department of Natural Resources. The USACE will be responsible

for conducting the consultation until the mitigation monitoring responsibilities are transferred to the NFS. Thereafter, the NFS will be responsible for conducting the consultation and for providing results of the consultation to USACE (i.e. NFS will be responsible for obtaining and providing to USACE all information necessary to prepare the District Consultation Report).

The USACE New Orleans District (CEMVN) is responsible for inputting information into the USACE Civil Works Mitigation Project Database for this project. This information will be input on an annual basis beginning in the year the mitigation is implemented and continuing throughout the 50-year period of analysis. The information will be input by the deadline(s) established by HQUSACE. The USACE will be responsible for gathering the information necessary for database input until the mitigation monitoring responsibilities are transferred to the NFS. Thereafter, the NFS will be responsible for gathering this information and providing it to CEMVN for input.

7.5 COST OF MITIGATION MONITORING AND REPORTING

The total cost of monitoring and reporting addressed herein is estimated to be $9.765 M. This preliminary estimate includes all mitigation monitoring and reporting costs throughout the 50-year period of analysis. This estimate includes the cost of conducting the additional monitoring required due to the need for one re-planting event following the initial planting event. It was assumed that one re-planting event would be necessary to meet the initial survival success criteria for planted native vegetation. If this assumption is erroneous, the estimated monitoring and reporting cost would decrease (a reduction in the Federal share of total cost). These cost estimates do not account for any further topographic alterations following completion of the final mitigation construction activities since it is not anticipated that such physical alterations will be necessary. If this assumption is violated, the estimated mitigation monitoring and reporting cost would increase due to the need for additional monitoring/reporting events. Note that this cost estimate does not include additional monitoring and reporting costs incurred if the adaptive management plan is implemented.

8. CONTINGENCY PLAN (ADAPTIVE MANAGEMENT)

This AM Plan is for the compensatory mitigation project related to unavoidable impacts due to construction of the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction project (WSLP). The Water Resources Development Act (WRDA) of 2007, Section 2036 (a) and USACE implementation guidance for Section 2036 (a) (CECW-PC 31 August 2009 Memorandum: “Implementation Guidance for Section 2036 (a) of the Water Resources Development Act of 2007 (WRDA 2007) – Mitigation for Fish and Wildlife and Wetland Losses”) requires a contingency plan i.e., adaptive management and monitoring plans be included in all mitigation plans for fish and wildlife and wetland losses.

Adaptive Management Planning

AM planning elements include development of a Conceptual Ecological Model (CEM), identification of key project uncertainties and associated risks, evaluation of mitigation plans for AM actions and the identification of potential AM actions (contingency plan) to better ensure the

mitigation project meets identified success criteria. The AM Plan is a living document that can and will be refined, if and as necessary, for revisions to the Project Mitigation Plan.

The level of detail in this AM Plan is based on the best currently available information developed as part of the Mitigation Plan and the Final EIS. The mitigation projects are described in Table K-2 on page K-2 of the Mitigation Plan and include BLH restoration in the Bonnet Carré, and swamp restoration at the Bonnet Carré, Blind River, Maurepas crawfish ponds, and Lutcher Polder farmlands. Swamp impacts would also be partially mitigated via purchase of mitigation credits from a mitigation bank; the specific mitigation bank has yet to be determined.

Conceptual Ecological Model

A CEM was developed to identify the major stressors and drivers affecting the proposed mitigation types (see table K-10). The CEM does not explain all possible relationships of potential factors influencing the sites. Rather, the CEM presents only those relationships and factors deemed most relevant to achieving the required acres/average annual habitat units (AAHUs). Furthermore this CEM represents the current understanding of these factors and will be updated and modified, as necessary, as new information becomes available. Stressors and drivers identified in the CEM were used during the plan formulation process to evaluate relative risks associated with each mitigation alternative.

Table K-10. Conceptual Ecological Model

Mitigation Project/ Issues, Driver	BLH1	SWMP1*	SWMP2	SWMP3	SWPM4	SWMP6
Hydrology (water table; wet/dry days; soil inundation, opening Bonnet Carré during flood events, Lake Pontchartrain)	+/-	NA	+/-	+/-	+/-	+/-
Vegetative Invasive Species	-	NA	-	-	-	-
Herbivory	-	NA	-	-	-	-
Subsidence	-	NA	-	-	-	-
Storm Surge	-	NA	-	-	-	-
Sea Level Rise	-	NA	-	-	-	-
Runoff	-	NA	-	-	-	-
Topography (elevation)	+/-	NA	-	-	-	-

Key to Cell Codes: - = Negative Impact/Decrease + = Positive Impact/Increase +/- = Duration dependent

*NA = not applicable; SWMP1 entails purchase of swamp credits from mitigation bank; hence issues and drivers are accounted for by the mitigation bank

Ecological success criteria establish mitigation performance requirements for each mitigation project. Site monitoring, data analysis and reporting help assess whether or not mitigation features are meeting the established ecological success criteria. In cases where monitoring indicates that a project is not meeting the ecological success criteria, a corrective action plan

(adaptive management) will be developed and implemented. If the initial success criteria are not attained then contingency plans are initiated and cost shared. If the initial success criteria are met, but later monitoring indicates intermediate or long-term project performance problems, then contingency plans are collaboratively developed but implemented by the NFS at their cost.

Adaptive management plans may be modified based on monitoring and other findings. Changes to the plans would be developed by the NFS in coordination with USACE and agencies. Changes would be coordinated with HQUSACE before they are finalized and implemented.

Sources of Uncertainty and Associated Risks

A fundamental tenet underlying AM is decision making and achieving desired project outcomes in the face of uncertainties. There are many uncertainties associated with mitigation and restoration of the coastal systems. The project delivery team (PDT) identified the following uncertainties during the planning process.

- Climate change, such as relative sea level rise, drought conditions, and variability of tropical storm frequency, intensity, and timing
- Subsidence and water level trends
- Opening of the Bonnet Carré due to flood events
- Uncertainty Relative to Achieving Ecological Success:
    - Water, sediment, and nutrient requirements
    - Magnitude and duration of wet/dry cycles for BLH
    - Nutrients required for desired productivity
    - Growth curves based on hydroperiod and nutrient application
    - Tree and marsh litter production based on nutrient and water levels
    - Tree propagation in relation to management/regulation of hydroperiod
    - Adjustment of hydrologic manipulations (railroad embankment cuts in SWMP2)
- Uncertainty Relative to Implementability
- Reliability and Resiliency of Design
- Self-Sustainability of Project Once Ecological Success Criteria are Achieved
- Long-Term Sustainability of Project Benefits
- Adaptability

Adaptive Management Evaluation

Mitigation projects for unavoidable impacts of implementing Alternative C (Recommended Plan) were evaluated against the potential need for AM actions. The AM Team, in coordination with the PDT, determined that uncertainties and risk elements identified for mitigation project features had been avoided, minimized or reduced. During plan formulation mitigation alternatives were analyzed, screened, and compared against a robust set of screening criteria (including Risk and Reliability) resulting in selection of mitigation plans which had the least amount of residual risks.

To further reduce uncertainties and diminish potential future risks the below listed items were incorporated into the WSLP mitigation plan and will be incorporated into the Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) plan to better ensure project success.

- Planting Guidelines for swamp and BLH canopy and midstory species

- General monitoring guidelines for Mitigation Project success
- Guidelines for Clearing, Grading, and other Earthwork Activities
- Specified Success Criteria (i.e., mitigation targets)
- Invasive Species Control
- Hydrologic Enhancement
- Supplementary Plantings as required (contingency)
- Corrective actions to meet ecological success as required (contingency)

Bonnet Carré Spillway Projects

The Bonnet Carré spillway has been opened ten times or an average of once every 8.1 years.[20] The number of years between openings varied from as little as two to as much as 23 years. There have been four times when the number of years between openings has been four years or less. This history indicates a probability of roughly 40% that the time between openings may be less than or equal to four years. The spillway has 350 bays and the number of bays opened during openings varied from 160 to 350, while the number of days the spillway has been opened during each opening event has varied from 13 days to 75 days and has averaged approximately 42 days. When all spillway bays are opened, the depth of standing water in the mitigation sites can reach as much as 12 feet, although such peak stages generally last only two to three days.

Planted BLH species would be best able to tolerate flooding events during spillway openings once the trees are 6 to 7 years old. Planted swamp species would be best able to tolerate spillway opening during flood events once the trees are 5 to 6 years old. Recent plantings of mostly cypress in the spillway have survived being submerged by floodwaters at one year of and and again at four years of age. Given the probability of a spillway opening within 4 years or less after the initial plantings, the contingency plan (adaptive management) for the Bonnet Carré Spillway projects assumes that the canopy and midstory species initially planted may have to be re-planted[21] on two separate occasions. The first re-planting event assumes that the spillway would be open within 4 years after initially planting seedlings. The second re-planting event assumes that the spillway could open again within 4 years of the first re-planting event.

The two adaptive management re-planting events would each involve total re-planting of both the canopy and the midstory species in accordance with the initial planting specifications. Adaptive management would require two annual monitoring events and reports after each re-planting event. Adaptive management of the Bonnet Carré sites would be implemented only if a spillway opening results in failure to achieve initial success criteria. The adaptive management plan assumes the need for a re-planting event and monitoring plus a second re-planting event and monitoring. It is possible that success criteria will be met obviating the need for any re-planting and monitoring.

If spillway openings damage or destroy the BLH1 or SWMP3 mitigation project features twice during the initial success evaluation period, the USACE will collaborate with the NFS and

[20] A spillway opening in 1994 was conducted as part of the evaluation of a Bonnet Carré freshwater diversion. It released approximately 14,000 cubic feet per second into the spillway. This opening was not a flood control opening and is not counted in this analysis.

[21] Cypress may not need to be replanted, but a cost was developed for the possibility.

agencies to develop new mitigation plans at sites outside of the Bonnet Carré Spillway. These could range from purchasing available mitigation bank credits to formulating new plans at sites similar to the ones at SWMP2, SWMP4, and SWMP6. Planning, design, construction, management and initial success monitoring for these new projects would be cost shared.

Other Swamp Restoration Projects

Contingency plans (adaptive management) for the Blind River (SWMP2) site are similar to the replanting protocols identified for the Bonnet Carré swamp mitigation sites. However, the risk of prolonged deep water submergence during floods is deemed to be much less frequent and intense. Flood events that introduce river water into the Blind River area are expected and the swamp tree species planted are ecologically suited to tolerate river flooding.

Contingency plans (adaptive management) for the Maurepas Crawfish Ponds (SWMP4), and Lutcher Polder Farmland (SWMP6) sites are similar to the replanting protocols identified for the Bonnet Carré swamp mitigation sites. However, the risk of prolonged riverine flooding at these sites is considered extremely unlikely given their locations.

The Maurepas and Lutcher sites are far removed from the potential direct impact of any spillway openings. However, these sites are located in a sub-basin connected to the Blind River. Floods in the area may occur during high rains or from backwater flooding. Such events in these areas are infrequent. Associated elevated water levels are generally slow in velocity and short in duration. Any flood related plant impacts are expected to be minimal and within the ecological tolerance of the planted swamp species.

Contingency plans for the Blind River (SWMP2) involves plantings of swamp canopy and midstory species which may require an additional re-planting as a contingency to the uncertainty of a drowning swamp that has little hydrologic connectivity. In addition, the hydrologic manipulation feature of making cuts into existing remnant railroad grades may require one additional cut or closure of a cut to insure that hydrologic responses are appropriate to restoring this swamp.
Monitoring reports will provide information about success criteria and may document events, conditions or trends that could trigger adaptive management actions. These actions may involve more tree plantings, herbivory control, or actions to introduce or manage water in the swamps. More complete adaptive management plans will be developed during the preconstruction engineering and design phase of the Project. Currently monitoring for an ecological success criteria is estimated to cost $4.09M and an adaptive management plan if needed is estimated to cost $2.27M. Both of these costs have been included in the total project cost estimate.

9. FINANCIAL ASSURANCES

Financial assurances are required to ensure the mitigation project will be successful. The Project Partnership Agreement (PPA) between the Non-Federal Sponsor and the Federal Government provides the required financial assurance for the project. If the NFS fails to perform, the USACE has the right to complete, operate, maintain, repair, rehabilitate or replace any project feature.

Such action would not relieve the NFS of responsibility to meet obligations and would not preclude the US from pursuing any remedy at law or equity to ensure performance.

10. DEFINITION OF TERMS

Growing Season As used herein, the growing season is considered to be the period from April through October of any given year, although some deviation from this typical range is allowed.

Interagency Environmental Team (IET) The "Interagency Environmental Team" has staff from the USACE and the following resource agencies; US Fish and Wildlife Service, National Marine Fisheries Service, US Environmental Protection Agency, State of Louisiana Office of Coastal Protection and Restoration, Louisiana Department of Natural Resources, Louisiana Department of Wildlife and Fisheries.

Invasive Plant Species All plants identified as invasive or as non-indigenous (exotic) in the following two sources:

Louisiana Aquatic Invasive Species Task Force. 2005. State Management Plan for Aquatic Invasive Species in Louisiana, Appendix B. Invasive Species in Louisiana (plants). Center for Bioenvironmental Research, Tulane & Xavier Universities, New Orleans, LA.

Barataria-Terrebonne National Estuary Program (BTNEP). 2012. Exotic Invasive Species of the Barataria-Terrebonne, Invasive Species in Louisiana. BTNEP, Thibodaux, LA.

Including: Japanese climbing fern (*Lygodium japonicum*), tall fescue (*Festuca arundinacea*), chinaberry (*Miscanthus sinensis*), Brazilian vervain (*Verbena litoralis* var. *brevibrateata*), coral ardisia (*Ardisia crenata*), Japanese ardisia (*Ardisia japonica*), cogon grass (*Imperata cylindrical*), golden bamboo (*Phyllostachys aurea),* and rescuegrass (*Bromus catharticus*).

Native Plant Species Plants that are not classified as invasive species and are not considered nuisance species.

Non-Federal Sponsor (NFS) Refers to the Coastal Protection and Restoration Authority Board.

Nuisance Plant Species Nuisance species are native species deemed detrimental due to their potential adverse competition with desirable native species. Nuisance plant species identified for the projects include; dog-fennel (*Eupatorium capillifolium, Eupatorium compositifolium*), marsh thoroughwort (*Eupatorium leptophyllum*), late-flowering thoroughwort (*Eupatorium serotinum*), common ragweed (*Ambrosia artemisiifolia*), giant ragweed (*Ambrosia trifida*), cattail (*Typha* spp.), grapevine (*Vitis* spp.), wild balsam apple (*Momordica charantia*), climbing hempvine (*Mikania scandens, M. micrantha*), pepper vine (*Ampelopsis arborea*), common reed (*Phragmites australis*), catbrier (*Smilax* spp.), blackberry (*Rubus* spp.), blue vervane (*Verbena hastata*), white vervane (*Verbena urticifolia*), wingstem (*Vervesina alternifolia*), frostweed (*Verbesina virginica*), tall ironweed (*Vernonia gigantea*), black willow (*Salix nigra*), and box elder (*Acer negundo*). After the placement of fill and initial plantings, the preceding list may be expanded to include other nuisance plant species. Additions to the list would be based on the results of the standard monitoring reports. USACE in coordination with the NFS and IET will determine

whether a particular species should be considered as a nuisance species and therefore eradicated or controlled.

Piezometer Typically a small-diameter observation well employed to measure water elevations in the surficial aquifer (water table elevations). Piezometers will be built in accord with the following: *U. S. Army Corps of Engineers. 2005. Technical standard for water-table monitoring of potential wetland sites. ERDC TN-WRAP-05-02. Vicksburg, MS: U.S. Army Engineer Research and Development Center*.

Planting Season This is considered the period from December 15 through March 15 (some deviation allowed).

Point-Centered Quarter Method A plot-less method of forest sampling. Use of this method will be in general compliance with: *Cottam, Grant and J. T. Curtis. 1956. The use of distance measures in phytosociological sampling. Ecology, 37(3):451-460.*

USACE Hydrophytic Vegetation Criteria Satisfying USACE hydrophytic vegetation criteria (i.e. plant community is dominated by hydrophytic vegetation) shall mean that sampling of the plant community demonstrates that one or more of the hydrophytic vegetation indicators set forth in the following reference is achieved: *USACE. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0); ERDC/EL TR-10-20. USACE Engineer Research and Development Center, Vicksburg, MS.*

Wetland Indicator Status of Plant Species A means of classifying the estimated probability of a species occurring in wetlands versus non-wetlands. Indicator categories include; obligate wetland (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), and obligate upland (UPL). The wetland indicator status of a particular plant species shall be as it is set forth in the following reference using the Region 2 listing. If USACE adopts a new list in the future it will apply. *Lichvar, Robert W. and J.T. Kartesz. 2009. North American Digital Flora: National Wetland Plant List, version 2.4.0. USACE, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH and BONAP, Chapel Hill, NC.*

Figure K-1: Bonnet Carré Spillway Bottomland Hardwood Restoration and Bonnet Carré Spillway Swamp Restoration

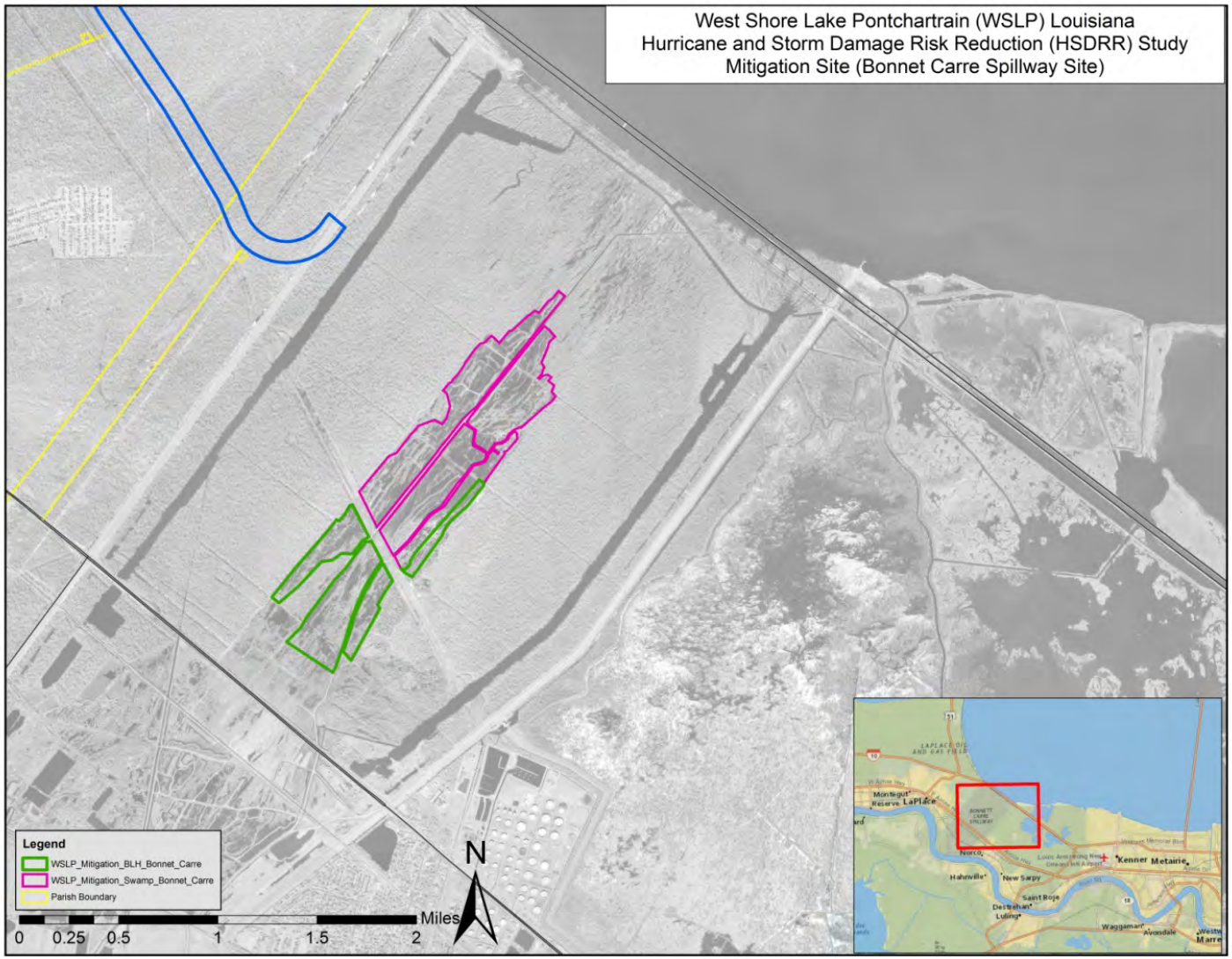


Figure K-2: Blind River Swamp Restoration

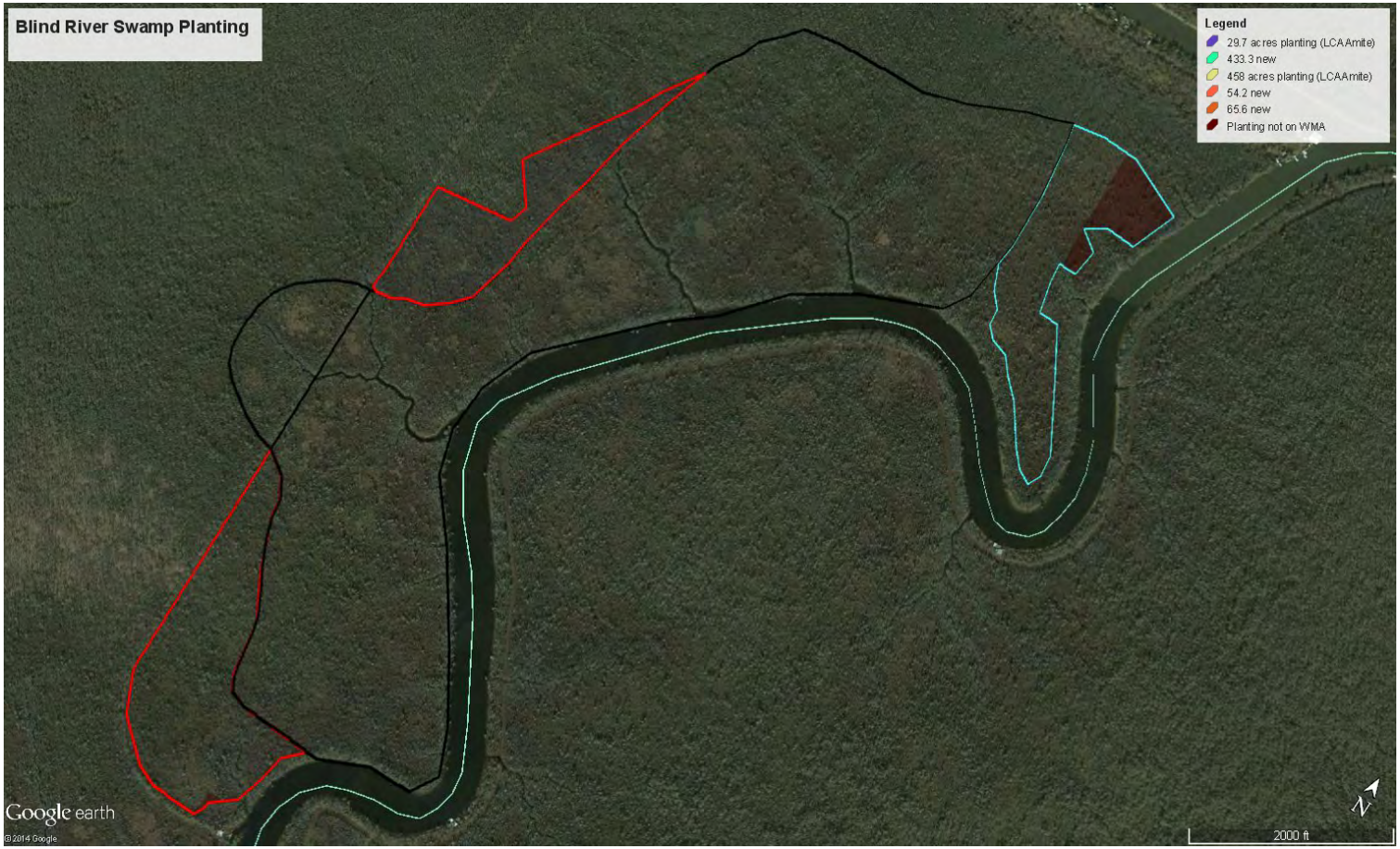
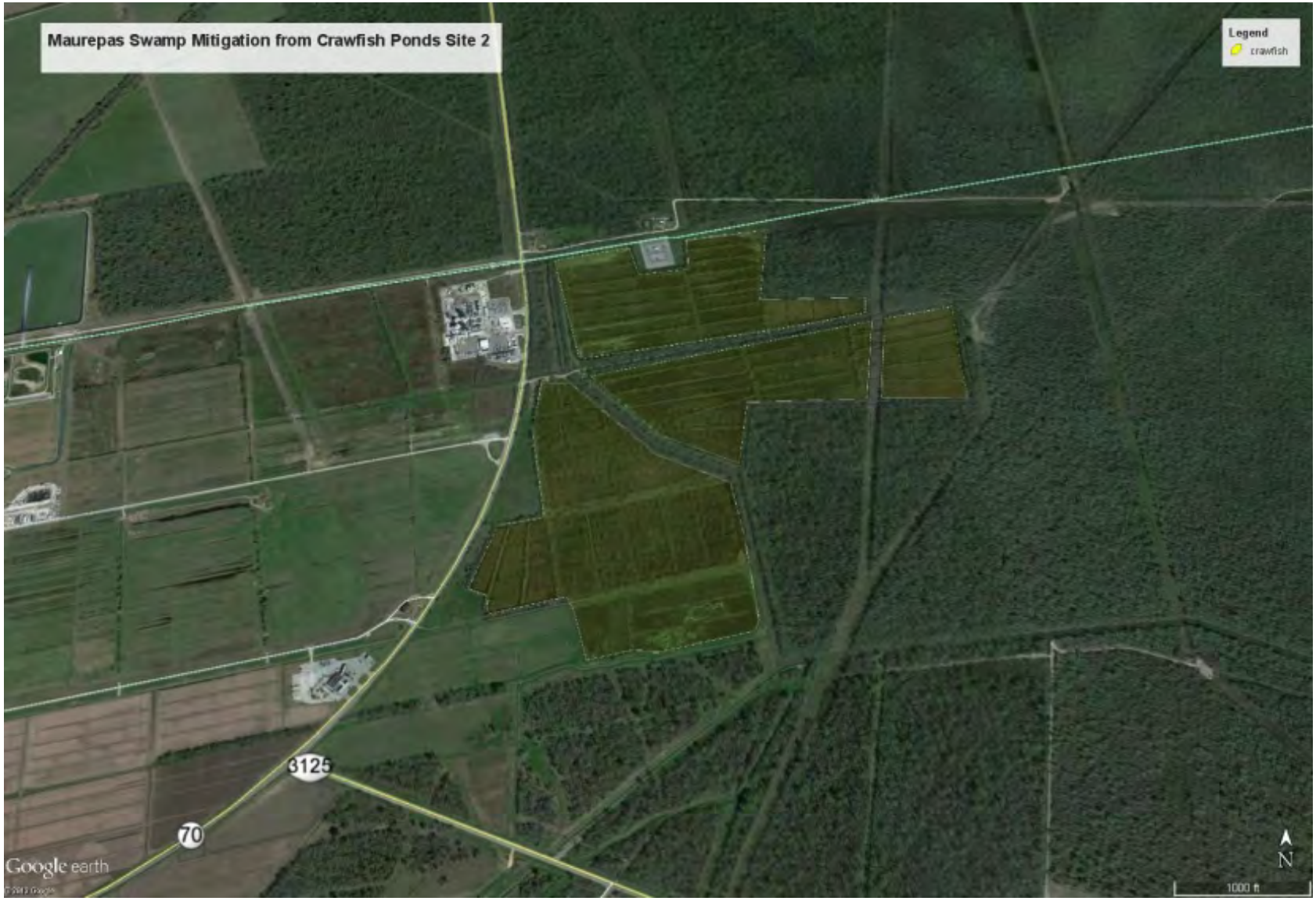


Figure K-3: Maurepas Crawfish Ponds Swamp Restoration (Sites 1, 2 and 3)


Maurepas Swamp Mitigation from Crawfish Ponds Site 2
Legend
crawfish
3125
70
Google earth
N
1000 ft

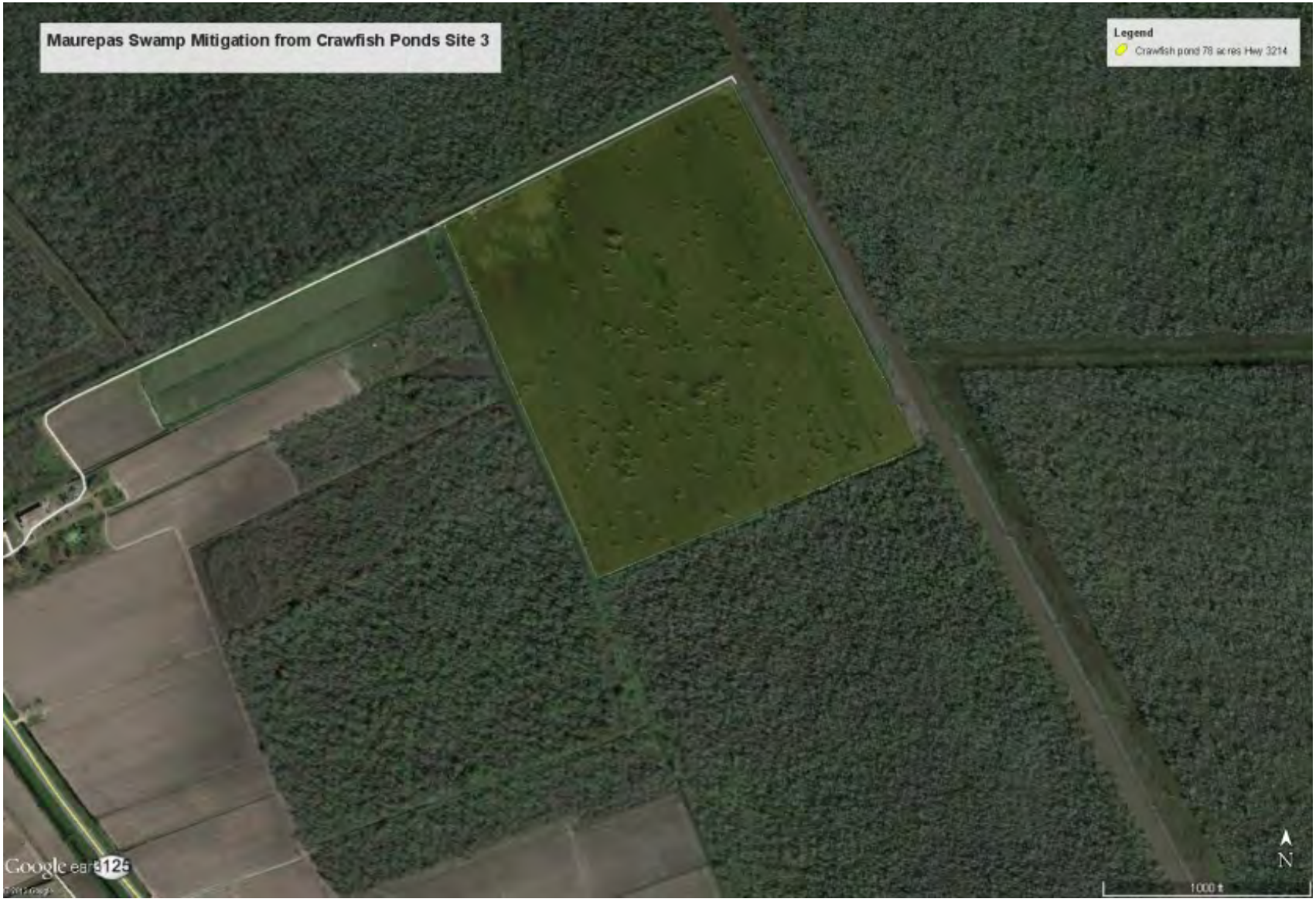
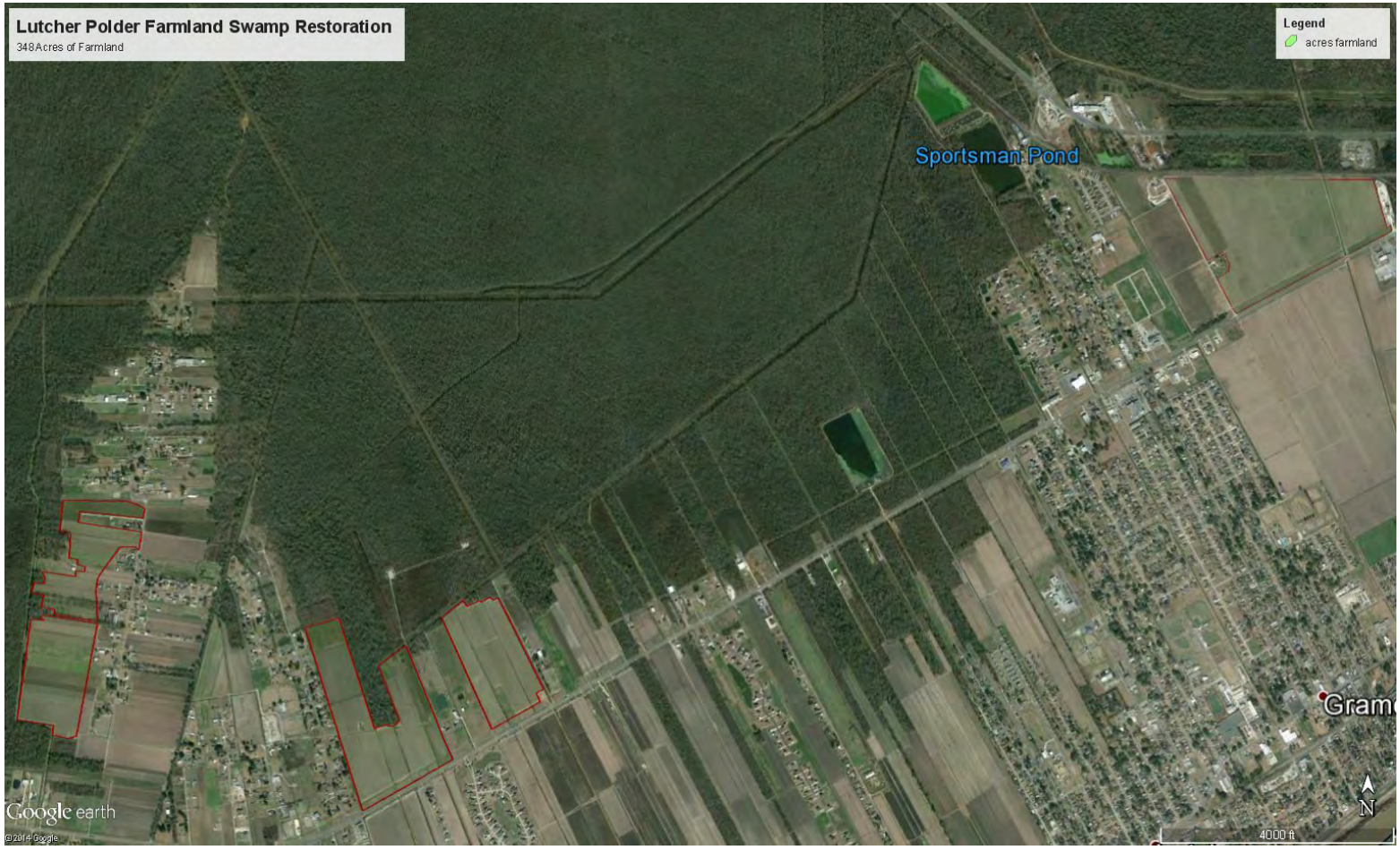

Maurepas Swamp Mitigation from Crawfish Ponds Site 3
Legend
Crawfish pond 78 acres Hwy 3214
Google earth
N
1000 ft

Figure K-4: Lutcher Polder Farmland Swamp Mitigation



WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex L

Adaptive Management and Monitoring Plan

(Included in the Mitigation Plan in Annex K)

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex M

Water Quality Analysis

West Shore-Lake Pontchartrain, Louisiana
Hurricane Protection Project

Water Quality Assessment

West Shore-Lake Pontchartrain, Louisiana
Hurricane Protection Project

Water Quality Assessment

Table of Contents

1.0 Affected Environment....1

1.1 Introduction....1
1.2 Methods, Criteria, and Guidelines....4
1.3 Study Area Historical and Existing Water Quality....8

2.0 Environmental Consequences....16

2.1 Future without Project....16
2.2 Future with Project....18

3.0 References....21

List of Figures

1.1 Study area and project features....2
1.2 Map of study area subsegments and subsegment average support values....11
1.3 Study area LPDES permitted discharges....13
1.4 Study area long-term water quality monitoring station locations....14

List of Tables

1.1 Lake Maurepas historical water quality summary....8
1.2 Study area subsegments....10
1.3 Subsegment average support values, 1998-2012....11
1.4 Study area 2012 303(d) list....12
1.5 Long-term water quality monitoring station information....13
1.6 Monitoring parameters selected for data summary....15

1.0 Affected Environment

1.1 Introduction

This resource is institutionally significant because of the Clean Water Act, as amended, the Pollution Prevention Act, the Safe Drinking Water Act, and the Water Resources Planning Act, regulations which provide for the protection of U.S. waters for the purposes of drinking, recreation, and wildlife. This resource is technically significant for the purposes of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. This resource is publicly significant because of the desire for clean water and water-related activities such as boating, swimming, fishing, and as a source of potable water for human and animal consumption.

1.1.1 Study Area Description

The study area is located in the southwestern portion of the Pontchartrain basin, a 9,700 square mile drainage basin connected to the Gulf of Mexico (Keddy et al. 2007). The northern basin includes sloping uplands, while the lower basin is estuarine, and in the northern limits of the Mississippi River delta plain (Blum and Roberts 2012). Primary surface water sources of the basin include the major tributaries of lakes Maurepas and Pontchartrain (the Tchefuncte, Tangipahoa, Amite-Comite, and Tickfaw rivers). Lakes Maurepas, Pontchartrain, and Borgne are the major estuarine embayments linking the basin to the Gulf of Mexico. Natural passes connecting these lakes include North Pass and Pass Manchac between lakes Maurepas and Pontchartrain, and Pass Rigolets and Chef Menteur Pass between lakes Pontchartrain and Borgne; the Inner Harbor Nagivation Canal (IHNC), Gulf Intracoastal Waterway (GIWW), and Mississippi River Gulf Outlet (MRGO) provide artificial connections between lakes Pontchartrain and Borgne, and the Gulf of Mexico (McCorquodale et al. 2009). The estuarine end of the basin also receives freshwater input from the adjacent Pearl River, and from episodic diversions of Mississippi River water for flood control. It includes swamp which transitions to marsh of increasing salinity regime eastward surrounding the lakes, followed by open bay and barrier islands on the eastern limits of the estuary.

The study area is bounded to the south and west by the Mississippi River, to the north by the St. James and St. John the Baptist Parish boundaries, and to the east by the western guide levee of the Bonnet Carré Spillway and the St. John the Baptist Parish boundary (Figure 1.1). This area, having a total footprint of approximately 234,000 acres, includes 1,250 acres of developed lands, 480 acres of undeveloped lands, approximately 113,000 acres of wetlands, and approximately 119,000 acres of open water. Wetlands in the area are largely comprised of environmentally stressed second-growth bald cypress-tupelo swamp.

1.1.2 Project Descriptions

The proposed project (Figure 1.1) is intended to provide hurricane storm damage risk reduction for communities on the east bank of the Mississippi River, in study area parishes (St. James and St. John the Baptist). The proposed levee alignment includes the construction of approximately 18.3 miles of hurricane storm damage risk reduction in the form of levees, t-walls, and several gated structures. In addition, the project includes several berms and floodproofing of structures in areas outside of the proposed levee.

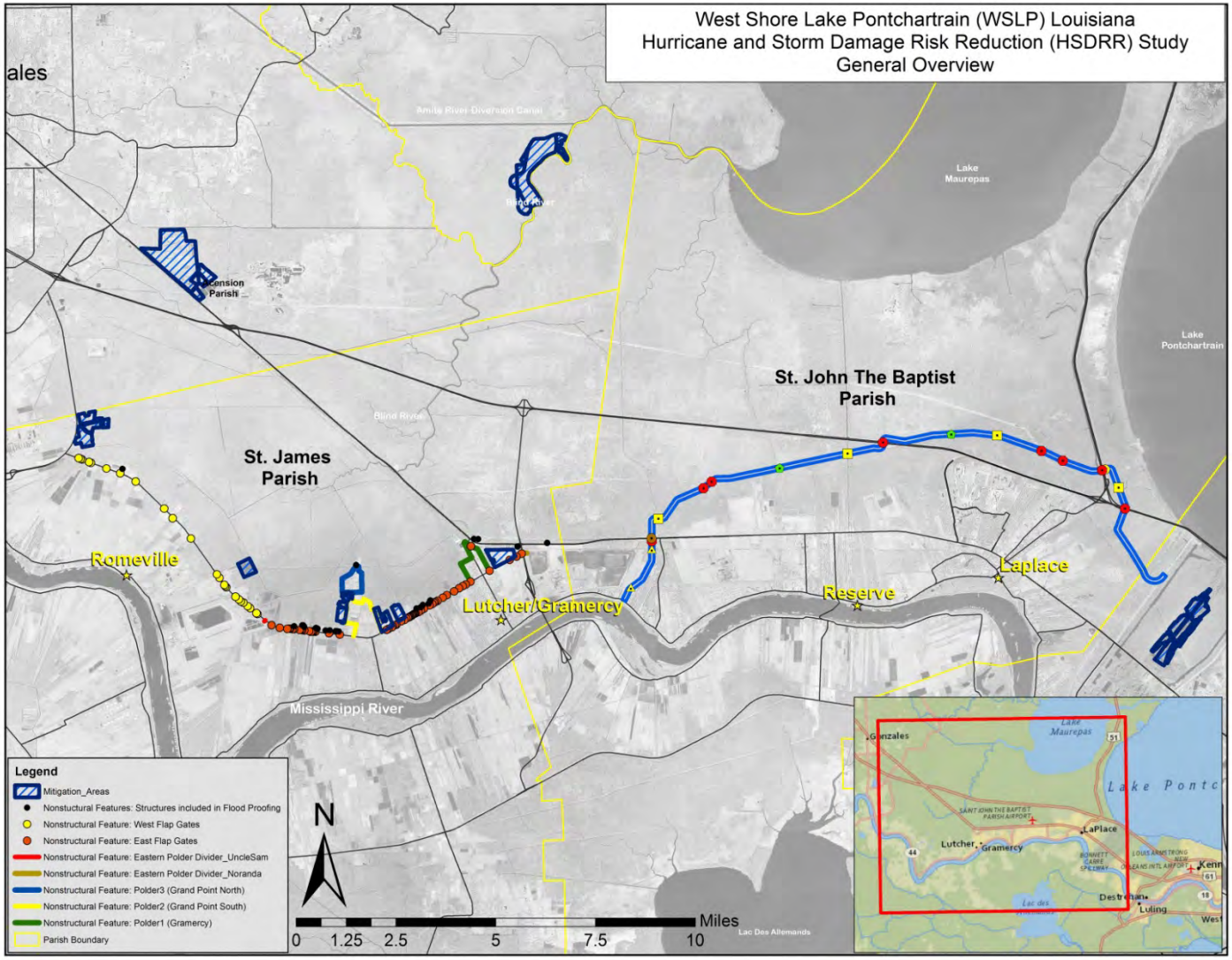


Figure 1.1. Study area and project features

Throughout this Annex the term "nonstructural" is used to describe the "berms" element and road with flap gates element as-well as the raising of homes and flood proofing of individual structures. In the main document "berms" element and road with flap gates element are no longer part of the nonstructural plan but part of a structural plan identified as localized storm surge reduction measures in St. James Parish.

Because the proposed project would enclose adjacent wetlands, artificial drainage would be included in the project in the form of gravity drainage structures and canals located adjacent to the proposed levee on both its protected and flood side, in order to reduce project impacts to water exchange between protected and flood side wetlands and waterbodies, in turn, reducing project impacts to hydrology, biology, and water chemistry.

Mitigation for the proposed hurricane protection project includes previously developed projects: Mitigation Bank (SWMP1) ,the Blind River Swamp Restoration (SWMP2), Bonnet Carré Spillway Swamp Mitigation (SWMP3), Bonnet Carré Spillway Bottomland Hardwood Mitigation (BLH1), Maurepas Crawfish Ponds Mitigation (SWMP4), and Lutcher Polder Farmlands Swamp Mitigation (SWMP6) projects.

The SWMP3 and BLH1 projects include creation of swamp and bottomland hardwood forest habitat within the Bonnet Carré Spillway, while the SWMP2 project entails tree plantings for enhancement of existing swamp habitat, and the SWMP4 and SWMP6 projects include creation of swamp habitat in existing abandoned agricultural land, (see USACE 2010a, 2013b for project details).

1.1.3 Study Area Water Quality Influences

Study area water quality is influenced by basin elevations, surface water budget, land cover and use, coastal and geological processes, and regional weather. The study area is in the southwestern portion of a basin consisting of uplands to the north and estuary to the south, with increasing estuary salinity eastward. As described in earlier, the basin is influenced by several rivers which provide freshwater to estuarine lakes connected to each other and, ultimately, to the Gulf of Mexico via several major passes.

The estuary has experienced hydromodification via the construction of canals and embankments. Major waterways within the estuary include the IHNC, MRGO, and GIWW. The estuary was formerly (1963-2009) connected to the Gulf of Mexico via the MRGO, which resulted in increased salinities (Sikora and Kjerive 1985; Tate et al. 2002); a rock barrier near Hopedale currently provides a hydrologic disconnect at normal water levels. The estuary has also been subjected to canal construction for oil exploration and cypress logging (Keddy et al. 2007). These canals and their associated spoil banks can modify local flow and drainage patterns. Additionally, road and railroad beds, as well as hurricane risk reduction features, provide hydraulic barriers within the estuary.

The basin includes upland forest and agricultural land north of the estuary, wetlands and open water within the estuary, development and agriculture along the Mississippi River corridor, and urban areas in greater New Orleans and Baton Rouge, and near the northern shorelines of lakes Pontchartrain and Maurepas (Demcheck et al. 2004). Tributaries of these lakes receive runoff from a mixture of non-developed, agricultural, and urban lands, having water quality characteristics associated with land cover and use. Undeveloped, forested areas in the northern basin contain aquatic communities associated with excellent water quality, while agricultural and urban areas have streams with water chemistry reflecting anthropogenic sources, including regional farming practices, treated and untreated sanitary inflows, and stormwater runoff. Increasing development in the watershed of study area tributaries has led to changes in stream discharge and/or water quality (Brown et al. 2010; Wu and Xu 2007; Turner et al. 2002;

Patil and Deng 2008; Southwick et al. 2002).

Chemical transformations occurring in the estuary can be biologically mediated by estuary wetlands. Wetlands have the ability to remove constituents such as nutrients, suspended sediments, organic matter, and metals from the water column, but can also serve as a source for these constituents, depending on factors such as duration of exposure to chemical loadings, wetland type, and hydrologic conditions (Mitsch and Gosselink 2000). Louisiana wetlands are not uniform in their ability to assimilate constituents (Rabalais et al. 1995).

A diversity of wetland types exist within the estuary, and are distributed based on surface water salinity as well as historical and current ground elevations. These wetlands are affected by marine and geological processes such as tidal variation, subsidence, and marine reworking of sediments (Gosselink 1984). Recently, anthropogenic factors are believed to have led to accelerated deterioration of estuary wetlands. In the study area, subsidence and impoundment has led to excessive flooding in the Maurepas Swamp, which prevents seed germination and recruitment of primary overstory tree species (Baldcypress and Water Tupelo), and can lead to tree stress and mortality (Keddy et al. 2007).

Regional and continental weather can also influence estuary water quality. For example, variations in precipitation, temperature, and wind direction can affect level of estuary marine influence, flow direction, water level, and wetlands biogeochemistry (Gosselink 1984). The estuary is periodically affected by tropical activity and the diversion of Mississippi River flood waters, which can lead to the influx of large volumes of salt- and/or freshwater. Recently, major hurricanes have affected the area approximately once every three years (in 2005, 2008, and 2011), while the influx of Mississippi River water through the Bonnet Carré Spillway for flood relief occurred in 1997, 2008, and 2011. Timing and amount of precipitation can also affect water quality. For example, Demcheck et al. (2004) found that pesticide and nutrient concentrations in Louisiana streams can vary seasonally based on timing of fertilizer and pesticide application. In the study area, a drought from spring 1999 to summer 2001 is believed to have contributed to an increased mortality rate of forested wetland tree species (Keddy et al. 2007).

1.2 Methods, Criteria, and Guidelines for Evaluation of Sediment and Water Quality

1.2.1 Water Quality

1.2.1.1 Louisiana Water Quality Inventory

The Clean Water Act (CWA) established a process for states to develop information on the quality of their water resources. Section 305(b) requires that each state develop a program to monitor the quality of its surface and groundwater, and prepare a report describing the status of its water quality. Section 303(d) requires states to list impaired waterbodies where water quality standards are not met and designated uses are not fully supported, and to develop a Total Maximum Daily Load (TMDL) for those waterbodies. The *Louisiana Water Quality Inventory Report: Integrated Report* (LDEQ 2013), prepared by the Louisiana Department of Environmental Quality (LDEQ), is the current form of biennial reporting of the status of Louisiana waters in accordance with CWA

sections 305(b) and 303(d).

For the purpose of water quality monitoring and assessment and development of TMDLs, Louisiana is divided into twelve major basins, and each basin is further divided into subsegments. This subsegment approach divides the state's waters into discrete hydrologic units. The subsegment system within each basin provides a framework for evaluating state waters. Subsegments are periodically added or removed as water quality standards related to a subsegment or group of subsegments are revised.

Section 305(b) of the Clean Water Act requires, among other items, a water quality assessment for each subsegment, which includes a description of each subsegment and the extent to which their waters provide for the protection and propagation of fish and wildlife and allow for recreational activities in and on the water (USEPA 2011). All assessments are prepared using existing and readily available water quality data and information in order to comply with rules and regulations under Section 305(b) of the Clean Water Act.

Subsequently, Section 303(d) of the Clean Water Act requires the identification, listing, and ranking for development of Total Maximum Daily Loads (TMDLs) for waters that do not meet applicable water quality standards after implementation of technology-based controls. By definition, a TMDL is the maximum amount of a pollutant that can be discharged into a water body from all sources (both point and non-point) and still maintain water quality standards.

Louisiana Water Quality Standards (*LAC 33:IX.1123*) define eight designated uses for surface waters, including: primary contact recreation; secondary contact recreation; fish and wildlife propagation; drinking water supply; oyster propagation; agriculture; outstanding natural resource; and limited aquatic life and wildlife use. Principal designated uses for Louisiana waterbodies include primary contact recreation, secondary contact recreation, and fish and wildlife propagation. The definitions for these primary uses are:

- *Primary Contact Recreation*—any recreational or other water contact activity involving prolonged or regular full-body contact with the water and in which the probability of ingesting appreciable amounts of water is considerable. Examples of this type of water use include swimming, skiing, and diving.
- *Secondary Contact Recreation*—any recreational or other water contact activity in which prolonged or regular full-body contact with the water is either incidental or accidental, and the probability of ingesting appreciable amounts of water is minimal. Examples of this type of water use include fishing, wading, and boating.
- *Fish and Wildlife Propagation*—the use of water for aquatic habitat, food, resting, reproduction, cover, and/or travel corridors for any indigenous wildlife and aquatic life species associated with the aquatic environment. This use also includes the maintenance of water quality at a level that prevents damage to indigenous wildlife and aquatic life species associated with the aquatic environment and contamination of aquatic biota consumed by humans. The use subcategory of *limited aquatic life and wildlife* recognizes the natural variability of aquatic habitats, community requirements, and local environmental conditions. *Limited aquatic life and wildlife* use may be

> designated for water bodies having habitat that is uniform in structure and morphology, with most of the regionally expected aquatic species absent, low species diversity and richness, and/or a severely imbalanced trophic structure. Aquatic life able to survive and/or propagate in such water bodies includes species tolerant of severe or variable environmental conditions. Water bodies that might qualify for the *limited aquatic life and wildlife* use subcategory include intermittent streams, and naturally dystrophic and man-made water bodies with characteristics including, but not limited to, irreversible hydrologic modification, anthropogenically and irreversibly degraded water quality, uniform channel morphology, lack of channel structure, uniform substrate, lack of riparian structure, and similar characteristics making the available habitat for aquatic life and wildlife suboptimal.

Designated uses and criteria for each subsegment are listed in the Louisiana Water Quality Standards. Designated uses have a specific suite of ambient water quality parameters used to assess their support. Data and information collected from within or immediately downstream of a subsegment are used to evaluate each subsegment's designated uses. Where more than one parameter and criterion define a designated use, support for each use is defined by the designated use's poorest performing (most severely impaired) parameter. Likewise, where data from more than one sample station are available, the most severely impaired station is used to make the assessment.

Following statistical determination of a water body's designated use support, along with a determination of the chemical parameters in the subsegment which might be impaired, a determination is then made as to which Integrated Report Category (IRC) the suspected water body impairment combination (WIC) should be placed in. A WIC is a single impairment affecting one subsegment. Based on the IR Category, it is possible that either a TMDL is required, or has been completed, for a particular subsegment.

In addition to use of numerical data, LDEQ regional staff members are asked for input regarding significant suspected sources of impairment, or whether impairment due solely to natural sources is occurring. Numerical data alone can suggest impairment for some Louisiana water bodies when in fact there is no impairment or the impairment is due exclusively to natural causes. Using best professional judgment, regional staff members familiar with the area suggest one or more suspected source for a subsegment's impairment.

Total maximum daily loads (TMDLs) indicate that the majority of the pollutant load entering state waters comes from nonpoint sources of pollution; therefore, LDEQ is implementing a watershed-based approach to reducing those loads in the water bodies where TMDLs have been completed. Presently, LDEQ utilizes both regulatory and non-regulatory mechanisms to control nonpoint sources of pollution. Urban storm water for cities with populations of 50,000 or greater and construction sites of one acre or more are regulated through the Louisiana Pollutant Discharge Elimination System (LPDES) permit program. Home sewage treatment systems are regulated through the LDHH. LDEQ's Water Quality Assessment Division (WQAD) currently houses the state's Nonpoint Source Management Program, which has been successful in implementing voluntary programs for forestry and agricultural sources of pollution. This has been done through coordination with other concerned agencies, such as the Louisiana Department

of Agriculture and Forestry (LDAF), the U.S. Natural Resource Conservation Service (NRCS), and the Louisiana State University (LSU) AgCenter. LDEQ will continue to monitor state waters through the four-year cyclic process to determine whether the current implementation strategy is successful in restoring and maintaining water quality and the designated uses within Louisiana.

1.2.1.2 Louisiana Pollutant Discharge Elimination System (LPDES)

Louisiana's water quality regulations require permits for the discharge of pollutants from any point source into waters of the state of Louisiana. This surface water discharge permitting system is administered under the Louisiana Pollutant Discharge Elimination System (LPDES) program.

LPDES permits are official authorization developed and promulgated by the Office of Environmental Services of LDEQ. The LPDES permit establishes the wasteload content of wastewaters discharged into waters of the state. The permitting process allows the state to control the amounts and types of wastewaters discharged into its surface waters, in order to meet water quality standards. In 1996, LDEQ assumed responsibility for administering the permitting, compliance, and enforcement activities of the National Pollutant Discharge Elimination System (NPDES) from the U.S. Environmental Protection Agency (USEPA).

1.2.1.3 Louisiana Nonpoint Source Management Plan

Nonpoint source pollution is a type of pollution which is generated during rainfall events, and includes, among other things, agricultural and urban runoff. Section 319 of the Clean Water Act requires that states develop a nonpoint source management plan to reduce and control nonpoint sources of pollution from the various types of land uses that contribute to water quality problems across the United States. Louisiana has determined that agriculture, forestry, urban runoff, home sewage systems, sand and gravel mining, construction, and hydromodification all contribute to nonpoint source pollution problems across the state. Nonpoint source pollution is the largest remaining type of water pollution that needs to be addressed within Louisiana, and across the nation, in order to restore full support for designated uses of impaired waterbodies.

Louisiana’s Nonpoint Source Program is managed by the LDEQ, and the goal of the program is to provide education regarding nonpoint source pollution and nonpoint source pollution prevention. The state of Louisiana has applied for and received Section 319 funds to implement both statewide and watershed projects to address nonpoint source pollution.

1.2.1.4 Water Quality Criteria

Water quality criteria are elements of state water quality standards expressed as constituent concentrations, levels, or narrative statements representing the quality of water supporting a particular designated use. When criteria are met, water quality will protect the designated use. Louisiana has both general and numeric criteria in *LAC 33:IX.1113*. General criteria are expressed in a narrative form and include aesthetics, color, suspended solids, taste and odor, toxic substances (in general), oil and grease,

foam, nutrients, turbidity, flow, radioactive materials, and biological and aquatic community integrity. Numeric criteria are generally expressed as concentrations or scientific units and include pH, chlorides, sulfates, total dissolved solids, dissolved oxygen, temperature, bacteria, and specific toxic substances.

The USEPA has published national criteria recommendations for a number of substances, and states may incorporate these without modifications into their water quality standards. However, while states generally use USEPA guidance and recommendations in developing and adopting their own criteria, they are allowed the flexibility to develop their own methodology as well. USEPA guidance is under continuous development and revision. States review and incorporate these developments and revisions into their water quality standards as appropriate.

Aquatic life criteria are designed to protect all aquatic life, including plants and animals, and include two types of criteria: acute, for short-term exposures (e.g., spills); and chronic for long-term or permanent exposures. One or both of the acute and chronic criteria may be related to other water quality characteristics, such as pH, temperature, or hardness. Separate criteria are developed for fresh and salt waters. The federal water quality standards regulations allow states to develop numerical criteria or modify USEPA's recommended criteria to account for site-specific or other scientifically defensible factors.

Human health criteria provide guidelines that specify the potential risk of adverse effects to humans due to substances in the water. Factors considered include body weight, risk level, fish consumption, drinking water intake, and incidental ingestion while swimming. Categories of criteria are then developed for each toxic substance for public drinking water supply, non-drinking water (swimming), and non-swimming water.

1.3 Study Area Historical and Existing Water Quality

1.3.1 Literature Review

Increasing development within the Pontchartrain basin with minimal regard for maintaining environmental quality during most of the twentieth century is cited as the primary cause of historical degradation of estuary waters (Hastings 2009). Associated pollution sources include sewage discharges into estuary tributaries, increased urbanization and farming, mining of waterbottoms, and oil and gas activities. While in recent decades many of these sources (particularly sewage discharges, shell dredging in Lakes Maurepas and Pontchartrain, and oil and gas exploration) have been curtailed, urbanization and farming continue, and in some areas is increasing (Patil and Deng 2008, Brown et al. 2010, Turner et al. 2002, Wu and Xu 2007).

Historical study area water quality is depicted in several references which include the review of data from basin tributaries and estuary lakes and passes. Garrison (1999) provides a summary of general parameters, major ions, nutrients, trace metals, and organic compounds for water quality data collected in Lake Maurepas between 1943 and 1995 (detected parameters are summarized in Table 1.1). Overall, the summary suggests the lake has historically been freshwater and oligotrophic, with generally low contaminant levels.

Table 1.1. Lake Maurepas historical water quality summary (source: Garrison[1999])

Group	Parameter	Units	Lake Maurepas, in Middle			Pass Manchac at Lake Maurepas		
			Percentile			Percentile		
			25th	50th (Median)	75th	25th	50th (Median)	75th
Physical properties	Specific Conductance	µmhos/cm	159	281	684	2120	2550	3700
	pH	SU	7	7.2	7.3	6.5	6.6	6.8
	Water Temperature	°C	16.8	21.5	26.5			
	Dissolved Oxygen	mg/L	7.2	7.8	9.1			
	Dissolved Solids					1230	1470	2150
Major cations	Calcium (Dissolved)	mg/L	5.9	7.2	11	20	24	38
	Magnesium (Dissolved)		3.6	5.8	13	36	46	72
	Sodium (Dissolved)		17	25	52	320	410	590
	Potassium (Dissolved)		2.5	3.1	4.7	11	15	30
Major Anions	Alkalinity, Total as CaCO3	mg/L	18	21	25			
	Sulfate (Dissolved)		10	17	32	89	120	150
	Chloride (Dissolved)		29	60	180	580	720	1100
Nutrients	Nitrate + Nitrite, Total as Nitrogen	mg/L	0.09	0.18	0.31			
	Phosphorus, Total as Phosphorus		0.09	0.11	0.14			
Trace Metals	Copper (Dissolved)	µg/L	<2	2	4			
	Iron (Dissolved)		50	140	230			
Organic Compounds	2,4-D (Total)	µg/L	0.03	0.04	0.06			

Sikora and Kjerve (1985) and Tate et al (2002) both reviewed pre- and post-MRGO salinity trends in the Pontchartrain estuary, with the monitoring site closest to the study area included in the review located on the western end of Pass Manchac. Findings suggest average salinities in Pass Manchac increased by 0.2-0.4 PPT post-MRGO. Sikora and Kjerve (1985) suggested that increased salinities were likely the result of short-lived influxes of high-salinity water. Both of these studies utilized data from prior to the 1999-2001 drought suspected of contributing to elevated salinities in the study area.

Patil and Deng (2008) investigated water quality and sediment load of the Amite River, the largest tributary of the Pontchartrain estuary, located on the northern border of the study area and to the west of Lake Maurepas. Median dissolved oxygen concentration in the lower Amite River decreased by 1 mg/L when comparing 1975-1990 and 1991-2005 monitoring data (6.8 mg/L vs. 5.7 mg/L), despite decreased median nutrient (nitrate plus nitrite, total phosphorus) concentrations between the same time periods, which was attributed to discontinued use of phosphate detergents and adoption of best management practices for agriculture and forestry in the watershed. Median total organic carbon and total suspended solids increased between time periods, suggesting factors other than nutrient enrichment, such as continued sand and gravel mining in the upper Amite River, and increased urbanization of the greater Baton Rouge area, may be responsible for the reduction in dissolved oxygen concentrations. Recently, a TMDL for organic enrichment and low dissolved oxygen levels was developed for this the Lower Amite River subsegment, with the associated report suggesting that increased conveyance in the Amite River diversion canal is contributing to reduced water velocities (and, therefore, increasing stagnation) in the lower river, which has served to concurrently reduce dissolved oxygen concentrations (LDEQ 2011).

Several studies within the study area were conducted in support of the diversion of Mississippi River water into the Maurepas Swamps (e.g., Lee Wilson and Associates 2001, Shaffer et al. 2003, Hoeppner et al. 2008, Lane et al. 2003, Shaffer et al. 2009), and include some discussion of study area water quality. Lane et al. (2003) provides a summary of water quality for surface water samples collected monthly from April to October 2000 (during the 1999-2001 drought in southern Louisiana) in the Blind River, Hope Canal, Dutch Bayou, Reserve Canal, and Lake Maurepas. Ranges of averages

for measured parameters are as follows: nitrate plus nitrite – 0-0.5 mg/L, total nitrogen – 0.35-0.9 mg/L, ammonium – 0-0.03 mg/L, chlorophyll a – 2-21 µg/L, phosphate – 0.015-0.95 mg/L, total phosphorus – 0.03-0.13 mg/L, total suspended solids – 9-44 mg/L, salinity – 2.2-9 PPT. Because of drought conditions during the sampling period, the data included in the study may not be representative of general water quality conditions in the study area. The remaining studies referenced include descriptions of the condition of swamp habitat as it relates to water quality. In general, studies show correlation between elevated salinities in the swamps surrounding Lake Maurepas and high rates of tree mortality in the years following the 1999-2001 drought, as well as increased plant production with combined nutrient addition and herbivory control. These studies primarily suggest that river water diversions during droughts may prevent some areas around the lake from experiencing high mortality rates of primary overstory tree species during times of elevated surface water salinities, and that increasing nutrient inputs (e.g., with diversions) while controlling for herbivory on a watershed scale may lead to increased swamp aboveground productivity.

1.3.2 Louisiana Water Quality Inventory

To provide a general assessment of study area historical water quality, a review of historical water quality inventories for subsegments within the study area was conducted. Table 1.2 and Figure 1.2 depict all subsegments included in the study area.

Table 1.2. Study area subsegments

Subsegment	Subsegment Description	Type	Size
040401	Blind River-Amite River Diversion canal to mouth at Lake Maurepas (Scenic)	River	5
040403	Blind River-Source to confluence with Amite River Diversion Canal (Scenic)	River	20
040404	New River-Headwaters to New River Canal	River	24
040601	Pass Manchac-Lake Maurepas to Lake Pontchartrain	River	7
040602	Lake Maurepas	Estuary	91
041001	Lake Pontchartrain-West of La. Hwy. 11 Bridge (Estuarine)	Estuary	559

Clean Water Act Section 305(b) assessments of study area subsegments, for each reporting period between 1998 and 2012, were included in the review. For each subsegment, an average designated use support value was calculated. The calculated average support values were a function of designated use and level of support. Support levels for each combination of subsegment, year, and designated use were as follows:

0: subsegment not supporting designated use
1: subsegment fully supporting designated use

The average support value calculated for each subsegment serves as a simplistic representation for subsegment health with respect to designated uses (with zero being the least healthy value possible, and one being the most). In order to develop a visual representation of the long-term health of each subsegment with respect to designated uses, the average support values for subsegments were color-coded, with breakpoints of 0.5 and 0.75. Table 1.3 and Figure 1.2 illustrates the average support values for each subsegment.

Table 1.3. Subsegment average support values, 1998-2012

Subsegment	Average of Support, 1998-2010
040401	0.46
040403	0.50
040404	0.17
040601	0.88
040602	0.45
041001	0.74

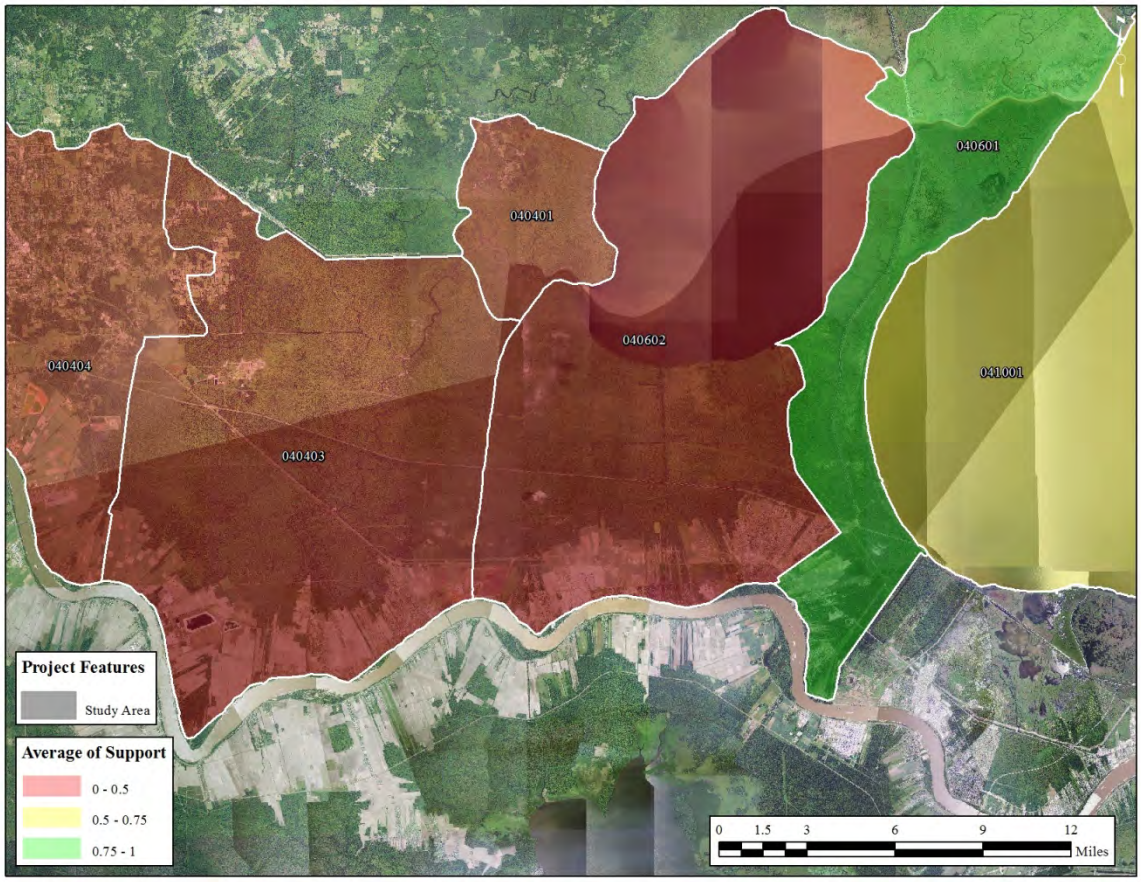


Figure 1.2. Map of study area subsegments and subsegment average support values

Long-term average support values reveal that impairments are commonplace in subsegments west of the Maurepas landbridge, and less common eastward.

To determine the most prevalent water quality issues present in the study area, historical Section 305(b) assessments were reviewed to determine the most significant causes and sources of subsegment impairment (Appendix Tables A.1 and A.2). Between 1998 and 2012, the most commonly suspected causes were non-native aquatic plants, low dissolved oxygen, mercury, fecal coliform, total phosphorus, sedimentation/siltation, and elevated turbidity, while the most commonly suspected sources were unknown sources, atmospheric deposition, introduction of non-native organisms, on-site treatment systems, wetland habitat modification, and site clearance for land development/redevelopment.

The most current (2012) 303(d) list for the study area is depicted in Table 1.4. Ordered by decreasing frequency cited, suspected causes of impairment include non-native aquatic plants, low dissolved oxygen, mercury, elevated turbidity, and fecal coliform, while suspected sources of impairment include wetland habitat modification, introduction of non-native organisms, atmospheric deposition, unknown sources, on-site treatment systems, natural sources, and agriculture.

Table 1.4. Study area 2012 303(d) list

Subsegment	Impaired Use for Suspected Cause	Suspected Cause of Impairment	Suspected Source of Impairment	IR Category	TMDL Priority
040401	FWP	Dissolved Oxygen	Wetland Habitat Modification	IRC 5	L
		Mercury	Atmospheric Deposition	IRC 4a	
			Source Unknown	IRC 4a	
		Non-Native Aquatic Plants	Introduction of Non-native Organisms	IRC 4b	
		Turbidity	Wetland Habitat Modification	IRC 4a	
	ONR	Turbidity	Wetland Habitat Modification	IRC 4a	
	PCR	Water Temperature	Natural Sources	IRC 5	L
			Wetland Habitat Modification	IRC 5	L
040403	FWP	Dissolved Oxygen	Agriculture	IRC 5	L
			Wetland Habitat Modification	IRC 5	L
		Mercury	Atmospheric Deposition	IRC 4a	
				IRC 5	L
			Source Unknown	IRC 4a	
				IRC 5	L
		Non-Native Aquatic Plants	Introduction of Non-native Organisms	IRC 4b	
040404	FWP	Dissolved Oxygen	On-site Treatment Systems	IRC 5	L
		Non-Native Aquatic Plants	Introduction of Non-native Organisms	IRC 4b	
	PCR	Fecal Coliform	On-site Treatment Systems	IRC 5	H
040602	FWP	Non-Native Aquatic Plants	Introduction of Non-native Organisms	IRC 4b	

Both historical 305(b) assessments and current 303(d) lists suggest primary study area water quality problems relate to hypoxia. As a further to this suggestion, as mentioned earlier, in 2011 a TMDL report was prepared for the lower Amite River watershed (located just north of subsegments partially included in the study area) to address organic enrichment and low dissolved oxygen.

1.3.3 LPDES Permitted Discharges

Figure 1.3 depicts locations of point source discharges permitted under the LPDES. There are a total of 123 LPDES permitted discharges in the study area, nearly all of which are located along the Mississippi River corridor. It is likely that most of these permitted discharges occur in the Mississippi River, which is currently only connected to the study area (its easternmost extent) when the Bonnet Carré Spillway is opened during flood stages on the river. There are a total of 26 toxic release inventory (TRI) permitted discharges in the study area, most (except for two) are also LPDES permitted discharges. Again, it is likely most of these permitted discharges go into the Mississippi River. Permitted discharges more relevant to the study are more likely to occur in major tributaries of the Pontchartrain Basin that feed into Lake Maurepas, such as the Amite and Tickfaw Rivers.

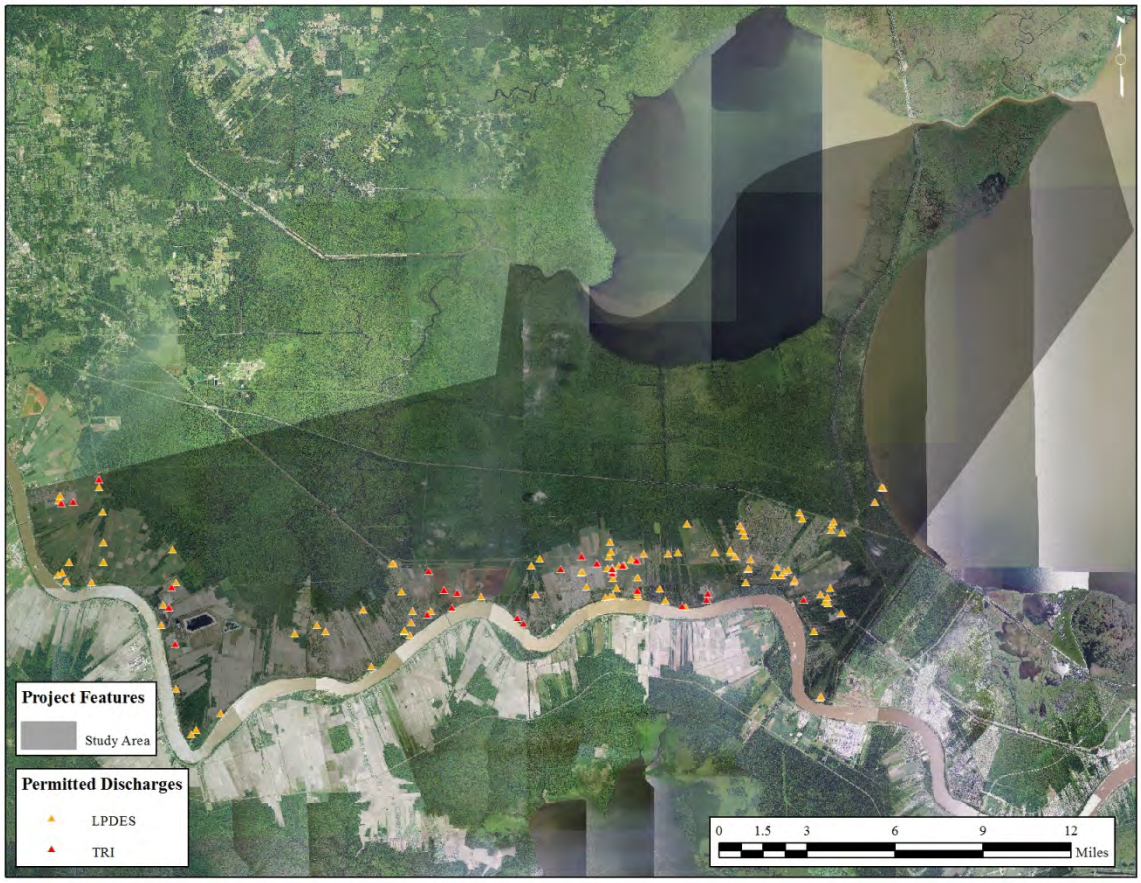


Figure 1.3. Study area LPDES permitted discharges

1.3.4 Water Quality Monitoring

1.3.4.1 Introduction

Long-term water quality monitoring in the study area has been conducted by the Louisiana Department of Environmental Quality (LDEQ). Table 1.5 and Figure 1.4 depict monitoring station locations and monitoring time periods, while Appendix Table A.3 includes monitoring metadata for each station.

Table 1.5. Long-term water quality monitoring station information

Station ID	Station Description	Subsegment	Latitude	Longitude	Monitoring Period	
					Begin	End
36	Pass Manchac at Manchac, Louisiana	040601	30.281389	-90.400278	1978	2011
117	Blind River near Gramercy, Louisiana	040403	30.100000	-90.735278	1978	1998
155	Mississippi Bayou north of Reserve, Louisiana	040602	30.123889	-90.582500	1991	1998
1102	Blind River near confluence with Lake Maurepas	040401	30.217222	-90.599444	2001	2010

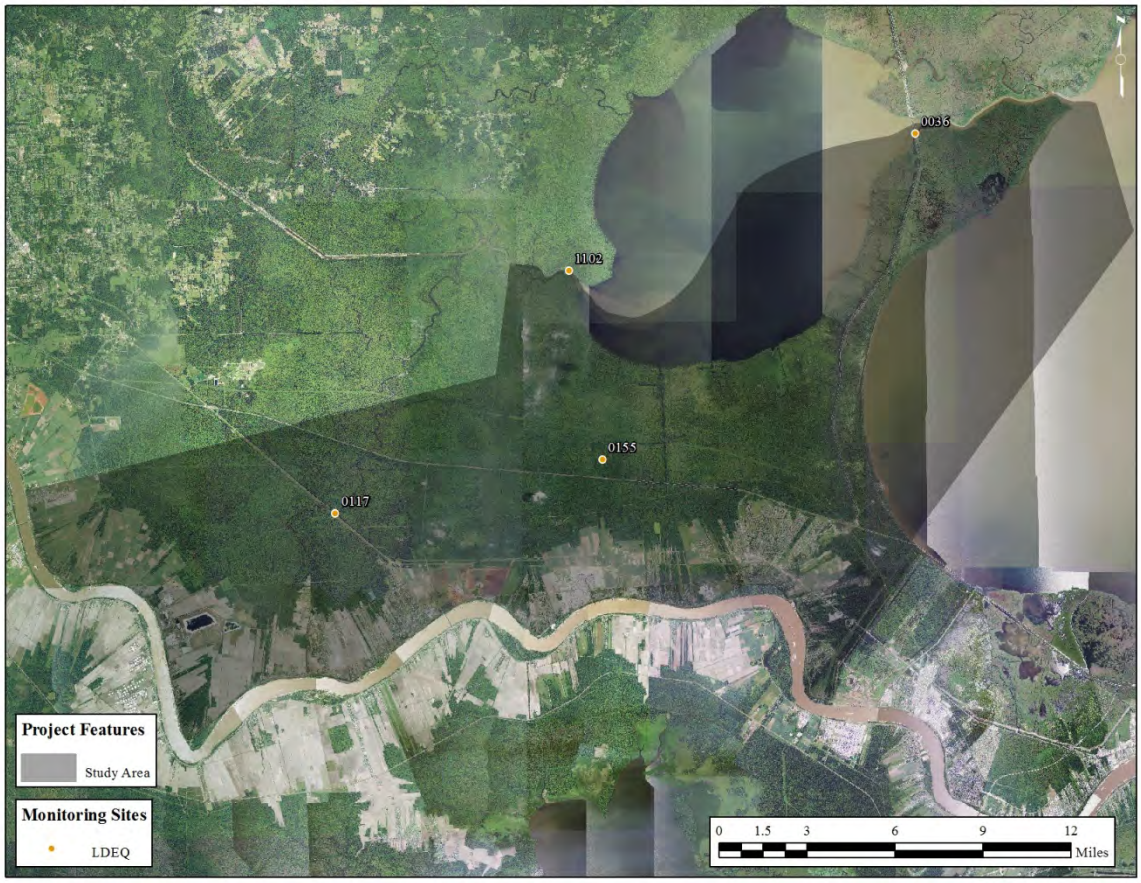


Figure 1.4. Study area long-term water quality monitoring station locations

1.3.4.2 Summary of Water Quality Monitoring Data

Monitoring parameters selected for data summary are listed in Table 1.6; more detailed information concerning these parameters is available in Appendix Table A.4. Parameters were selected for summary based on the need for a general depiction of study area water quality (i.e., conventional parameters), frequency of citation as a suspected cause of impairment in the study area, water quality concerns in the study area highlighted in available literature discussed elsewhere in this assessment, and duration and continuity of dataset.

Table 1.6 – Monitoring parameters selected for data summary

Chemical Class	Parameter
Inorganic/General Chemistry	Alkalinity
	Carbon, Total Organic
	Chloride, Ion Chromatograph
	Conductivity
	Dissolved Oxygen
	Dissolved Oxygen, Percent Saturation
	Dissolved Solids, Total
	Nitrogen, Nitrate + Nitrite
	Oxygen Demand, Chemical
	pH
	Turbidity
Metals	Nickel
N/A	Fecal Coliform
	Suspended Solids, Total

For each long-term monitoring station in the study area, data was summarized by means of boxplots (overall and seasonal), quantile plots, and trend analysis (Appendix Figures A.1-A.42).

Overall boxplots (Appendix Figures A.1-A.14) reveal the differences between the monitoring stations based on salinity gradient and habitat. For example, stations 117 and 155, located in the Maurepas swamps, generally contain higher alkalinity, fecal coliform, and dissolved nickel, and lower dissolved oxygen, while station 36 contains elevated chloride, conductivity, and total dissolved solids relative to all other stations. The most notable characteristics of the boxplots were the high alkalinity and low dissolved oxygen at swamp sites, along with the high chloride and conductivity concentrations for the Pass Manchac station relative to other stations. For stations 117 and 155, the lower and upper quartiles of dissolved oxygen concentrations were below the state water quality criteria for freshwater of 5 mg/L.

Seasonal boxplots (Appendix Figures A.15-A.28) reveal trends for several parameters. Highest alkalinity values for stations 117 and 155 occur in summer, while highest total organic carbon concentrations for these stations follow in the fall. For dissolved oxygen, at all sites summer concentrations were lowest, while winter concentrations were highest. Chloride, conductivity, and total dissolved solids follow similar seasonal patterns at all sites, which includes generally increasing concentrations from winter to fall (winter<spring<summer<fall). For stations 117 and 155 and all seasons except winter, and station 1102 in summer, both the lower and upper quartiles of dissolved oxygen concentrations were below the state water quality criteria for freshwater of 5 mg/L.

In general, quantile plots (Appendix Figures A.28-A.42) for all parameters and stations have high correlation coefficients (note: for some parameters, data was log transformed to improve correlation coefficients). Of the 45 regression curves, 45 had a correlation coefficient greater than 0.9, and 32 had a coefficient greater than 0.95. Particularly for parameters where a large proportion of the data was below reporting limits (e.g., Fecal Coliform, nitrate plus nitrite, nickel), correlation coefficients were low, and data was skewed, suggesting nonparametric methods of trend analysis (e.g., Kendall's Tau) may be more appropriate.

Trend analysis using linear regression may be most meaningful for parameters with a normal data distribution and longer/larger data record (including alkalinity, total organic carbon, chloride, chondictivity, dissolved oxygen, total dissolved solids, turbidity, and total suspended solids, for stations 36 and 117). Several parameters, including alkalinity, chloride, pH, turbidity, and total suspended solids, suggest decadal-scale cycling of water quality. Overall, correlation coefficients were very low (less than 0.05) for the larger data record stations, with the exception of alkalinity (0.0563, negative regression slope) and chloride (0.056, positive regression slope) for station 36, suggesting increasing marine influence in the Pass Manchac area between 1978 and 2011.

2.0 Environmental Consequences

2.1 No Action Alternative (Future without Project Conditions)

Direct Impacts: There would be no direct impacts from implementing the No Action Alternative.

Indirect Impacts: Water quality trends in the study area are expected to continue without the proposed project. In particular, existing dissolved oxygen trends, as well as existing trends in salinity gradients, would be expected to continue. Additionally, without the proposed project, there would be an increased risk of flooding of the Mississippi River corridor in the study area, and drainage of floodwaters into waterbodies connected to the Maurepas Swamp and Lake Maurepas is a possibility. If this were to occur, a large volume of diluted urban and agricultural runoff characterized by elevated nutrients, metals, and organics could be introduced into the Maurepas Swamps and Lake Maurepas, similar to the introduction of urban floodwaters from New Orleans into Lake Pontchartrain following Hurricanes Katrina and Rita in 2005 (Farris et al. 2007) .

Cumulative Impacts: Without the proposed project, study area would still be affected by the following:

Development: Including oil and gas development within the study area; the continued increasing development of the Amite River watershed and other watersheds which influence study area water quality; existing and future Federal, state, and municipal flood-damage reduction projects; and continued agricultural and forestry activities and associated management practices.

Development in the Amite River watershed combined with policy on waterbottom mining within the river are expected to have a significant influence on future water quality conditions for Amite River water entering the project area. Further watershed development could lead to increasing frequency of impairment of the lower Amite River for low dissolved oxygen, as well as an increasing influence of urbanization on Amite River water quality. Improved policy on waterbottom mining within the river could offset some of the impacts of development on parameters such as dissolved oxygen and turbidity.

The study area vicinity includes the Greater New Orleans Hurricane and Storm Damage Risk Reduction System (GNOHSDRRS) and the Mississippi River and Tributaries (MR&T) Flood Risk Reduction System. These systems serve to reduce the risk of

flooding of developed areas during the catastrophic events that frequent coastal Louisiana, including tropical activity and flooding on the Mississippi River. As flooding of developed areas can have significant water quality impacts, these systems serve to reduce water quality impacts of development, although concurrently they further encourage development in areas vulnerable to natural disaster, thus potentially enhancing water quality impacts in the case of flooding of developed areas during catastrophic events.

Impacts to water quality in association with the GNOHSDRRS are described in the system's Comprehensive Environmental Document (USACE 2013a). Temporary water quality impacts during system construction included elevated suspended sediments during construction activities and storm water runoff, while projected long-term impacts were associated in the document with hydromodification, levee expansion into the aquatic environment (including expansion into wetlands areas), and construction of impervious surfaces on formerly undeveloped landscapes.

For the MR&T system, study area water quality impacts would be expected to be similar in quality to the temporary water quality impacts associated with GNOHSDRRS construction. However, because there are few waterbodies on the protected side of the MR&T alignment in the study area, these impacts would generally be of limited quantity.

For both systems, future levee lifts would be expected to have impacts similar to those described in the previous paragraphs; however, for the GNOHSDRRS, projected impacts associated with levee expansion into the aquatic environment may be less significant, as during future upgrades there may be less wetland area subject to levee fill as a result of chronic wetland loss in the Greater New Orleans vicinity.

Restoration Efforts: The LCA Convent Blind River and the Maurepas Swamp Diversion projects are included within the study area (USACE 2010b, LCWCRTF 2002). These projects have the potential to locally reduce salinity stress and temporarily improve dissolved oxygen levels; however, concurrently they have the potential to generate significant changes in wetlands biogeochemistry, some of which may negatively affect wetland plant community resiliency (e.g., see Swarzenski et. al 2005). Additionally, the recent MRGO closure may influence study area water quality by reducing slightly area salinities during salinity intrusion events (e.g., during a drought).

Federal and state water quality management programs: Programs such as those described in this assessment would continue with the purpose of improving water quality and reducing the frequency of impairment of study area waterbodies. Programs to address land use practices in the Mississippi River watershed and associated river water quality impacts may be particularly important in determining study area water quality, because of the multiple Mississippi River diversion projects that would affect the study area (Broussard 2008).

Coastal deltaic processes: The study area would continue to be impacted by coastal deltaic processes associated with a transgressive delta, such as subsidence, erosion, and habitat conversion. The Maurepas Swamp area is anticipated to continue in its decline while converting to marsh and open water, in turn affecting local water quality conditions.

Climate: Future changes in atmospheric temperature are anticipated to impact sea-level, and may also impact frequencies of tropical activity (Mousavi et. al 2011), with anticipated impacts to water quality (e.g., increasing frequency of salinity intrusion events, flooding of study area communities).

2.2 Future with Project Conditions

2.2.1 Proposed projects

Direct Impacts: The proposed hurricane storm damage risk reduction project includes construction of approximately 18.3 miles of levee and 6.8 miles of berms, and would directly impact the areas within the proposed footprints which currently consist of wetlands and open water. These areas would be converted into upland habitat, and would no longer provide for surface water quality. As coastal wetlands are known to benefit water quality—for example, as a source or sink for constituents—these benefits would no longer exist within the proposed levee and berm footprints coincident with existing aquatic habitat.

Direct impacts to water quality associated with the proposed project would also be related to construction activities, including the placement of fill and construction materials for project construction, and runoff from construction areas. Because fill material and construction materials are anticipated to be relatively free of contaminants, discharge of these materials into existing adjacent surface waters and wetlands is not anticipated to lead to significant adverse effects on aquatic organisms present at the construction sites.

Construction activities are expected to result in localized increases in turbidity associated with runoff of construction materials. To minimize construction-related impacts, a Stormwater Pollution Prevention Plan (SWPPP) will be implemented for construction activities. SWPPPs will be prepared in accordance with good engineering practices emphasizing storm water Best Management Practices and complying with Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology. The SWPPP will identify potential sources of pollution which may reasonably be expected to affect storm water discharges associated with the construction activity. In addition, the SWPPP will describe and ensure the implementation of practices which are to be used to reduce pollutants in storm water discharges associated with the construction activity and to assure compliance with the terms and conditions of this permit (USEPA 2012).

Placement of dredged material for the proposed SWMP3, and BLH1 projects, as well as land grading for the proposed SWMP4 and SWMP6 projects, is expected to result in some temporary changes in water chemistry for adjacent waters, such as lowered dissolved oxygen, elevated biochemical oxygen demand, elevated turbidity, and elevated nutrients, and oxidation of reduced metals species. Following construction activities, impacts of dredged and graded material on water quality would dissipate.

Indirect Impacts: The proposed hurricane storm damage risk reduction project would indirectly impact study area water quality. Although gravity drainage structures are being incorporated into project design to minimize changes in flow and water level between the flood and protected side of the proposed levee alignment, water exchange between the

flood and protected side may be modified, leading to localized areas of stagnation and reduced salinities behind the levee alignment, along with local areas of increased salinity on the flood side of the alignment.

Any expansion of development in the area could lead to additional point and nonpoint discharges within the hurricane and storm damage risk reduction system, which could further degrade water quality, especially on the protected side of the proposed alignment. The protected side of the proposed alignment includes urban and agricultural (primarily surgarcane farming) areas; typical runoff quality for these land uses is described in Frederick 2011, Southwick et al. 2002, and Demcheck et al. 2004, and includes characteristics such as elevated metals, nutrients, and pesticides.

Hydrology plays a major role in biogeochemical cycling in wetlands (Mitsch and Gosselink 2000), which in turn can affect water quality. Operation of these structures is expected to have a significant impact on biogeochemical cycling for wetlands in the study area, particularly on the protected side of the proposed levee alignment. This could be beneficial or detrimental, depending on the operation of gates and tidal exchange structures and impediment of flow caused by the proposed project.

Beneficial indirect water quality impacts of the proposed mitigation projects would largely be relegated to within the project footprints, and would likely relate to changes in biogeochemical cycling from establishment of swamp and bottomland hardwood forest habitat in existing agricultural lands, open water areas, and low quality wetlands areas.

Cumulative Impacts: The proposed projects, combined with other coastal activities (such as those included in the cumulative impacts discussion section for future without project conditions), would cumulatively impact study area water quality, both beneficially and detrimentally. For example, it is foreseeable that the proposed project may impact the attainment of state water quality standards in the study area, leading to changes in regulation of point and nonpoint source discharges within the area, particularly on the protected side of the proposed alignment. This is an issue that needs to be addressed by MVN and LDEQ, so as to avoid impacting the attainment of State water quality standards in the future. Although the intent of the proposed alignment is to minimize impacts to water circulation and water levels, and operation of drainage features may change with changes in sea-level.

The combination of the proposed hurricane storm damage risk reduction project, the LCA CBRD project, and the Maurepas Swamp Diversion project could complicate study area water quality and hydrology, particularly for the protected side of the proposed alignment. Both an increase in water input from the Mississippi River and changes in drainage patterns for the protected side of the proposed alignment could lead to significant impacts to the biogeochemistry of the wetlands of the Maurepas Swamp.

For the SWMP3 and BLH1 projects, because of the small footprint of the proposed projects and their relative isolation from major waterbodies, water quality impacts in synergy with other projects and activities in the area would generally be minor. In the case of an opening of the Bonnet Carré Spillway (part of the MR&T Flood Risk Reduction System), water quality conditions within the footprint of these mitigation

projects would largely be temporarily supplanted by those of the Mississippi River. In addition, if mitigation sites are not sufficiently established in the event of a significant spillway opening, it is possible that the sites would be eroded, thus eliminating any water quality functions and characteristics associated with the mitigation projects.

For the SWMP2 project, development in the Amite River watershed combined with policy on waterbottom mining within the river are expected to have a significant influence on future water quality conditions for Amite River water entering the project area. Further watershed development could lead to increasing frequency of impairment of the lower Amite River for low dissolved oxygen, as well as an increasing influence of urbanization on Amite River water quality. Improved policy on waterbottom mining within the river could offset some of the impacts of development on parameters such as dissolved oxygen and turbidity.

For the SWMP4 and SWMP6 projects, local development may affect quality of created swamp. Local runoff in these areas from urban areas and agricultural lands (primarily utilized for sugarcane) may contain elevated levels of metals, nutrients, pesticides, and other organic contaminants capable of being assimilated by and augmenting these created wetlands (e.g., see Demcheck et al. 2004, Southwick et al. 2002). Future development in areas adjacent to these mitigation sites could enhance runoff quality.

3.0 References

Blum, M.D. and H.H. Roberts. 2012. *The Mississippi Delta Region: Past, Present, and Future*. Annual Review, Earth Planetary Science 2012.40:655-683.

Broussard, W.P. 2008. *A Century of Land Use and Water Quality in Watersheds of the Continental U.S*. MS thesis, Louisiana State University, Baton Rouge, Louisiana. http://etd.lsu.edu/docs/available/etd-07072008-182001/. Last accessed on May 28, 2012.

Brown, K.M., G. George, and W. Daniel. 2010. *Urbanization and a threatened freshwater mussel: evidence from landscape scale studies*. Hydrobiologia 655:189-196.

Couvillion, B.R., Barras J.A., Steyer G.D., Sleavin W., Fischer M., Beck H., Trahan N., Griffin B., and Heackman D. Land Area Change in Coastal Louisiana from 1932 to 2010. U.S. Geological Survey Scientific Investigations Map 3164. http://pubs.usgs.gov/sim/3164/. Last accessed on September 29, 2013

Demcheck, D.K., R.W. Tollett, S.V. Mize, S.C. Skrobialowski, R.B. Fendick Jr., C.M. Swarzenski, and S. Porter. 2004. *Water Quality in the Acadian-Pontchartrain Drainages, Louisiana and Mississippi, 1999-2001.* U.S. Geological Survey Circular 1232. http://pubs.usgs.gov/circ/2004/1232/. Last accessed on May 22, 2013.

Demcheck, D.K. and C.M. Swarzenski. 2003. *Atrazine in Southern Louisiana Streams, 1998-2000*. U.S. Geological Survey Fact Sheet FS-011-03. http://la.water.usgs.gov/publications/pdfs/FS-011-03.pdf. Last accessed on May 22, 2013.

Farris, G.S., G.J. Smith, M.P. Crane, C.R. Demas, L.L. Robbins, and D.L. Lavoie, eds. 2007. *Science and the storms—the USGS response to the hurricanes of 2005*. U.S. Geological Survey Circular 1306. http://pubs.usgs.gov/circ/1306/. Last accessed on May 28, 2013.

Frederick, C.P. 2011. Water-Quality Characteristics of Urban Storm Runoff at Selected Sites in East Baton Rouge Parish, Louisiana, February 2006 through November 2009. U.S. Geological Survey Scientific Investigations Report 2011-5199. http://pubs.usgs.gov/sir/2011/5199/. Last accessed on January 15, 2014

Garrison, C.R. 1999. *Statistical Summary of Surface-Water Quality in Louisiana—Lake Pontchartrain-Lake Maurepas Basin, 1943-95*. Louisiana Department of Transportation and Development Water Resources Technical Report No. 55G. http://la.water.usgs.gov/publications/pdfs/TR55G.pdf. Last accessed on May 22, 2013.

Gosselink, J.G. 1984. *The Ecology of Delta Marshes of Coastal Louisiana: A Community Profile*. U.S. Fish and Wildlife Service Report FWS/OBS-84/09. http://www.nwrc.usgs.gov/techrpt/84-09.pdf. Last accessed on May 22, 2013.

Hastings, RW. 2009. *The Lakes of Pontchartrain: Their History and Environments*. Jackson, MS: University Press of Mississippi. 272 pp.

Hoeppner, S.S., G.P. Shaffer, and T.E. Perkins. 2008. *Through droughts and hurricanes: Tree mortality, forest structure, and biomass production in a coastal swamp targeted for restoration in the Mississippi River Deltaic Plain*. Forest Ecology and Management 256:937-948.

Keddy, P.A., D. Campbell, T. McFalls, G.P. Shaffer, R. Moreau, C. Dranguet, and R. Heleniak. 2007. *The Wetlands of Lakes Pontchartrain and Maurepas: Past, Present and Future.* Environmental Reviews 15:43-77. http://www.drpaulkeddy.com/pdffiles/Keddy%20et%20al.%202007%20--%20Env%20Revs%20--%20Lake%20Ponchartrain%20Wetlands%20review.pdf. Last accessed on May 22, 2013.

Lane, R.R., H.S. Mashriqui, G.P. Kemp, J.W. Day. J.N. Day, and A. Hamilton. 2003. *Potential nitrate removal from a river diversion into a Mississippi delta forested wetland*. Ecological Engineering 20:237-249.

Lee Wilson and Associates, Inc. 2001. *Diversion into the Maurepas Swamps*. Contract No. 68-06-0067, WA No. 5-02. U.S. Environmental Protection Agency, Dallas, TX.

Louisiana Coastal Wetlands Conservation and Restoration Task Force (LCWCRTF). 2002. *River Reintroduction into Maurepas Swamp*. https://lacoast.gov/new/Projects/Info.aspx?num=PO-29. Last accessed on March 18, 2014.

Louisiana Department of Environmental Quality (LDEQ). 2013. *2012 Louisiana Water quality Inventory: Integrated Report*. http://www.deq.louisiana.gov/portal/DIVISIONS/WaterPermits/WaterQualityStandardsAssessment/WaterQualityInventorySection305b/2012IntegratedReport.aspx. Last accessed on May 22, 2013.

McCorquodale, J.A., R.J. Robin, I.Y. Georgiou, and K.A. Haralmpides. 2009. *Salinity, Nutrient, and Sediment Dynamics in the Pontchartrain Estuary.* Journal of Coastal Research 54:71-87.

Mitsch, W.J. and J.G. Gosselink. 2000. *Wetlands, 3rd Ed*. John Wiley & Sons, New York. 920 pp.

Mousavi, M.E., J.L. Irish, A.E. Frey, F. Olivera, and B.L. Edge. *Global warming and hurricanes: the potential impact of hurricane intensification and sea level rise on coastal flooding*. Climate Change 104:575-597.

Patil, A. and Z.Q. Deng. 2008. *Watershed Scale Variation in Water Quality in Lake Pontchartrain Basin*. From American Society of Civil Engineers World Environmental and Water Resources Congress 2008. http://ascelibrary.org/doi/pdf/10.1061/40976%28316%29641. Last accessed on May 22, 2013.

Rabalais, N.N., Q. Dortch, D. Justic, M.B. Kilgen, P.L. Klerks, P.H. Templet, and R. E. Turner. 1995. *Status and Trends of Eutrophication, Pathogen Contamination, and Toxic Substances in the Barataria-Terrebonne Estuarine System*. Barataria-Terrebonne

National Estuary Program Publication #22. http://www.btnep.org/BTNEP/resources/downloads/publications.aspx. Last accessed on May 22, 2013.

Shaffer, G.P., W.B. Wood, S.S. Hoeppner, T.E. Perkins, J. Zoller, and D. Kandalepas. 2009. *Degradation of Baldcypress-Water Tupelo Swamp to Marsh and Open Water in Southeastern Louisiana, U.S.A.: An Irreversible Trajectory?* Journal of Coastal Research, Special Issue 54:152-165

Shaffer, G.P., T.E. Perkins, S. Hoeppner, S. Howell, H. Bernard, and A.C. Parsons. 2003. *Ecosystem Health of the Maurepas Swamp: Feasibility and Projected Benefits of a Freshwater Diversion.* Contract No. XX-XX-XXXX. U.S. Environmental Protection Agency, Dallas, TX.

Sikora, W.B. and B. Kjerfve. 1985. *Factors Influencing the Salinity Regime of Lake Pontchartrain, Louisiana, a Shallow Coastal Lagoon: Analysis of a Long-Term Data Set.* Estuaries 8(2A):170-180. http://geotest.tamu.edu/userfiles/167/50.pdf. Last accessed on May 22, 2013.

Southwick, L.M., C.G. Brandon, T.S. Kornecki, and J.L. Fouss. 2002. Potential Influence of Sugarcane Cultivation on Estuarine Water Quality of Louisiana's Gulf Coast. Journal of Agricultural and Food Chemistry 50:4393-4399. https://afrsweb.usda.gov/SP2UserFiles/Place/64200500/csr/ResearchPubs/kornecki/kornecki_02a.pdf. Last accessed on January 16, 2014.

Swarzenski, C.M., T.W. Doyle, and T.G. Hargis. *Pore-Water and Substrate Quality of the Peat Marshes of the Barataria Preserve, Jean Lafitte National Historical Park and Preserve, and Comparison with Penchant Basin Peat Marshes, South Louisiana, 2000-2002*. USGS Scientific Investigations Report 2005-5121. http://water.usgs.gov/nps_partnership/jela.php. Last accessed on May 22, 2013.

Tate, J.N., A.R. Carrilo, R.C. Bergeer, and B.J. Thibodeaux. 2002. *Salinity Changes in Pontchartrain Basin Estuary, Louisiana, Resulting from Mississippi River-Gulf Outlet Partial Closure Plans with Width Reduction*. Technical Report ERDC/CHL TR-02-12. Vicksburg, MS: U.S. Army Engineer Research and Development Center. http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA408114. Last accessed on May 22, 2013.

Turner, R.E., Q. Dortch, D. Justic, and E.M. Swenson. 2002. *Nitrogen loading into an urban estuary: Lake Pontchartrain (Louisiana, U.S.A.)*. Hydrobiologia 487:137-152.

U.S. Army Corps of Engineers (USACE). 2010a. *Louisiana Coastal Area (LCA) Ecosystem Restoration Study, Volume II of VI, Final Integrated Feasibility Study and Supplemental Environmental Impact Statement for the Amite River Diversion Canal Modification, Ascension and Livingston Parishes, Louisiana*. U.S. Army Engineer District, New Orleans. http://www.lca.gov/Projects/13/final_reports.aspx. Last accessed on March 5, 2014.

U.S. Army Corps of Engineers (USACE). 2010b. *Louisiana Coastal Area (LCA)*

Ecosystem Restoration Study, Volume IV of VI, Final Integrated Feasibility Study and Supplemental Environmental Impact Statement for the Small Diversion at Convent/Blind River, St. James Parish, Louisiana. U.S. Army Engineer District, New Orleans. http://www.lca.gov/Projects/12/final_reports.aspx. Last accessed on March 18, 2014.

U.S. Army Corps of Engineers (USACE). 2013a. *Comprehensive Environmental Document, Greater New Orleans Hurricane and Storm Damage Risk Reduction System. U.S. Army Engineer District, New Orleans*. http://nolaenvironmental.gov/CED.aspx. Last accessed on March 19, 2014.

U.S. Army Corps of Engineers (USACE). 2013b. *Programmatic Individual Environmental Report #36, Lake Pontchartrain and Vicinity Hurricane Storm Damage and Risk Reduction Mitigation, Orleans, Plaquemines, St. Bernard, St. Charles, St. John the Baptist, and St. Tammany Parishes, Louisiana.* U.S. Army Engineer District, New Orleans. http://www.nolaenvironmental.gov/projects/usace_levee/IER.aspx?IERID=36. Last accessed on March 5, 2014.

U.S. Department of Agriculture (USDA). 2014. *U.S. Department of Agriculture National Agricultural Statistics Service, Cropscape – Cropland Data Layer*. http://nassgeodata.gmu.edu/CropScape/. Last accessed on March 14, 2014.

U.S. Environmental Protection Agency (USEPA). 2012. *Stormwater Pollution Prevention Plans for Construction Activities*. http://cfpub.epa.gov/npdes/stormwater/swppp.cfm. Last accessed on March 14, 2014.

U.S. Environmental Protection Agency (USEPA). 2011. *Impaired Waters and Total Maximum Daily Loads*. http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/index.cfm. Last accessed on May 22, 2013.

U.S. Geological Survey (USGS). 2013. *Streamflow and Nutrient Delivery to the Gulf of Mexico for October 2012 to May 2013 (Preliminary)*. http://toxics.usgs.gov/hypoxia/mississippi/oct_jun/. Last accessed on March 14, 2014.

Wu, K and Y.J. Xu. 2007. *Long-term freshwater inflow and sediment discharge into Lake Pontchartrain in Louisiana, USA*. Hydrological Sciences Journal 52(1):166-180.

West Shore-Lake Pontchartrain, Louisiana
Hurricane Protection Project

Water Quality Assessment

Appendix

West Shore-Lake Pontchartrain, Louisiana
Hurricane Protection Project

Water Quality Assessment

Appendix

List of Figures

A.1 Count of suspected causes of impairment, 1998-2012 ..... A-1
A.2 Count of suspected sources of impairment, 1998-2012 ..... A-1
A.3 Long-term water quality monitoring parameters A-2
A.4 Long-term water quality monitoring metadata for selected parameters A-3

List of Tables

A.1-14 Boxplots A-4
A.15-28 Seasonal Boxplots A-5
A.29-42 Quantile plots A-6
A.43-56 Trend analysis A-7

Table A.1. Count of suspected causes of impairment, 1998-2012

Suspected Cause of Impairment	Count
Non-Native Aquatic Plants	24
Dissolved Oxygen	21
Mercury	20
Fecal Coliform	12
Total Phosphorus	10
Sedimentation/Siltation	10
Turbidity	9
Copper	7
Pathogen Indicators	6
Metals	5
Flow Alteration	4
Nitrate/Nitrite	4
Chloride	4
Total Dissolved Solids	4
Total Nitrogen	3
Nutrients	2
Sulfates	2
Other Habitat Alterations	2
Pesticides	2
Oil and Grease	2
Water Temperature	1

Table A.2. Count of suspected sources of impairment, 1998-2012

Suspected Source of Impairment	Count
Source Unknown	30
Atmospheric Deposition	18
Introduction of Non-native Organisms	16
On-site Treatment Systems	10
Wetland Habitat Modification	9
Site Clearance for Land Development/Redevelopment	9
Urban Runoff	4
Agriculture	4
Natural Sources	4
Recreational Activities	4
Flow Alteration	3
Groundwater Loadings	3
Land Disposal	2
Petroleum/Natural Gas Activities	2
Industrial Point Source Discharges	2
Municipal Point Source Discharges	2
Animal Feeding Operations	2
Construction	1
Upstream Sources	1

Table A.3. Long-term water quality monitoring parameters

Chemical Class	Parameter	Station ID			
		36	117	155	1102
Inorganic/General Chemistry	Alkalinity	X	X	X	X
	Carbon, Total Organic	X	X	X	X
	Chloride, Ion Chromatograph	X	X	X	X
	Chlorophyll-a				X
	Color	X	X	X	X
	Conductivity	X	X	X	X
	Dissolved Oxygen	X	X	X	X
	Dissolved Oxygen, Percent Saturation	X	X		X
	Dissolved Solids, Total	X	X	X	X
	Hardness, as CaCO3	X	X	X	X
	Nitrogen, Ammonia	X			X
	Nitrogen, Kjeldahl	X	X	X	X
	Nitrogen, Nitrate + Nitrite	X	X	X	X
	Oxygen Demand, Chemical	X	X		
	pH	X	X	X	X
	Phosphorus, Total	X	X	X	X
	Salinity	X	X	X	X
	Sodium	X			X
	Sulfate	X	X	X	X
	Temperature, Water	X	X	X	X
	Turbidity	X	X	X	X
Metals	Arsenic	X	X	X	X
	Cadmium	X	X	X	X
	Chromium	X	X	X	X
	Copper	X	X	X	X
	Lead	X	X	X	X
	Mercury	X	X	X	
	Nickel	X	X	X	X
	Zinc	X			X
N/A	Fecal Coliform	X	X	X	X
	Secchi Depth	X	X	X	X
	Solids, Total Percent of Wet Sample	X	X		
	Stream Depth				X
	Suspended Solids, Total	X	X	X	X
	Total Coliform	X	X		
Semi-Volatile Organic Compounds	Dichlorobenzene, 1,2-	X			X
	Dichlorobenzene, 1,3-	X			X
	Dichlorobenzene, 1,4-	X			X
	Dichloroethene, 1,1-	X	X	X	X
	Trichlorobenzene, 1,2,3-				X
Volatile Organic Compounds	Benzene	X	X	X	X
	Bromoform	X	X	X	X
	Bromomethane	X	X	X	X
	Carbon Tetrachloride	X	X	X	X
	Chlorobenzene	X	X	X	X
	Chlorodibromomethane	X	X	X	X
	Chloroethane	X	X	X	X
	Chloroethyl Vinyl Ether, 2-	X	X	X	
	Chloroform	X	X	X	X
	Chloromethane	X	X	X	X
	Dichlorobromomethane	X	X	X	X
	Dichloroethane, 1,1-	X	X	X	X
	Dichloroethane, 1,2-	X	X	X	X
	Dichloroethylene, trans-1,2-	X	X	X	X
	Dichloropropane, 1,2-	X	X	X	X
	Dichloropropene, cis-1,3-	X	X	X	X
	Dichloropropene, trans-1,3-	X	X	X	X
	Ethylbenzene	X	X	X	X
	Methyl Tertiary Butyl Ether (MTBE)	X			X
	Methylene Chloride	X	X	X	X
	Tetrachloroethane, 1,1,2,2-	X	X	X	X
	Tetrachloroethylene	X	X	X	X
	Toluene	X	X	X	X
	Trichloroethane, 1,1,1-	X	X	X	X
	Trichloroethane, 1,1,2-	X	X	X	X
	Trichloroethylene	X	X	X	X
	Trichlorofluoromethane	X	X	X	X
	Vinyl Chloride	X	X	X	X
	Xylene, o-				X
	Xylenes, m- and p-				X

Table A.4. Long-term water quality monitoring metadata for selected parameters

Chemical Class	Parameter	Station ID											
		36			117			155			1102		
		n	Begin	End	n	Begin	End	n	Begin	End	n	Begin	End
Inorganic/General Chemistry	Alkalinity	270	1978	2011	156	1978	1998	45	1991	1998	36	2001	2010
	Carbon, Total Organic	237	1978	2001	174	1978	1998	44	1991	1998	18	2001	2006
	Chloride, Ion Chromatograph	272	1978	2011	179	1978	1998	45	1991	1998	36	2001	2010
	Conductivity	403	1978	2011	258	1978	1998	87	1991	1998	69	2001	2010
	Dissolved Oxygen	275	1978	2011	195	1978	1998	45	1991	1998	37	2001	2010
	Dissolved Oxygen, Percent Saturation	78	1978	2011	120	1978	1989				25	2006	2010
	Dissolved Solids, Total	269	1978	2011	171	1978	1998	45	1991	1998	36	2001	2010
	Nitrogen, Nitrate + Nitrite	276	1978	2011	194	1978	1998	45	1991	1998	36	2001	2010
	Oxygen Demand, Chemical	143	1978	1990	127	1978	1990						
	pH	352	1978	2011	240	1978	1998	45	1991	1998	37	2001	2010
	Turbidity	273	1978	2011	186	1978	1998	45	1991	1998	36	2001	2010
Metals	Nickel	98	1991	2011	43	1991	1998	45	1991	1998	11	2001	2010
N/A	Fecal Coliform	258	1978	2011	172	1978	1998	43	1991	1998	36	2001	2010
	Suspended Solids, Total	268	1978	2011	173	1978	1998	45	1991	1998	36	2001	2010

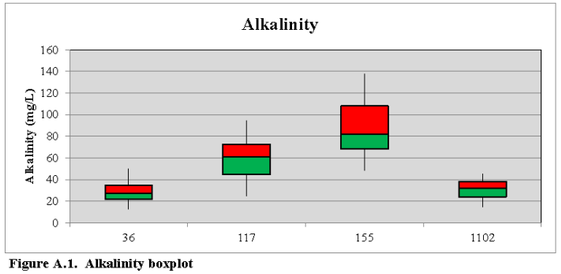


Figure A.1. Alkalinity boxplot

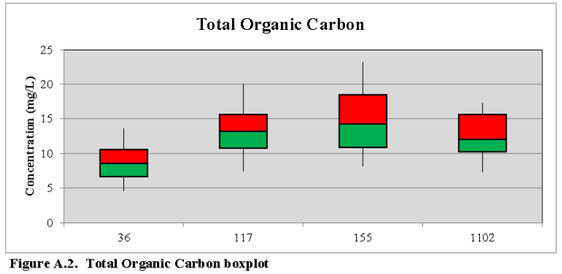


Figure A.2. Total Organic Carbon boxplot

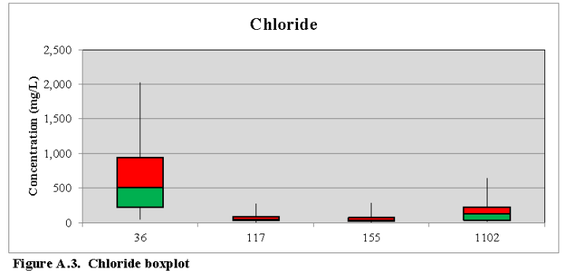


Figure A.3. Chloride boxplot

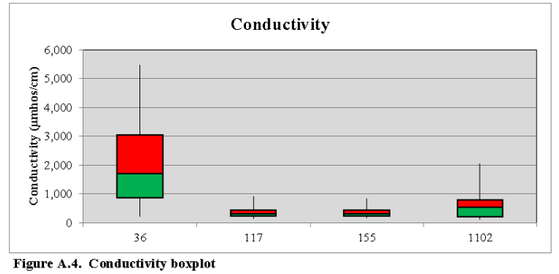


Figure A.4. Conductivity boxplot

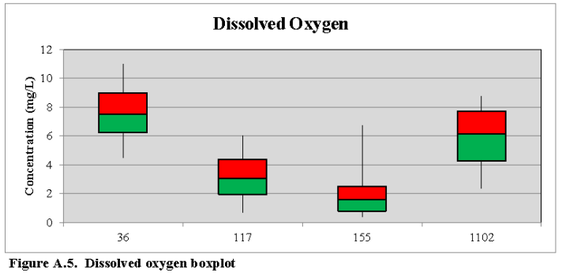


Figure A.5. Dissolved oxygen boxplot

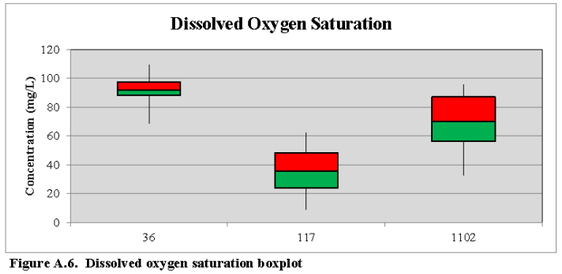


Figure A.6. Dissolved oxygen saturation boxplot

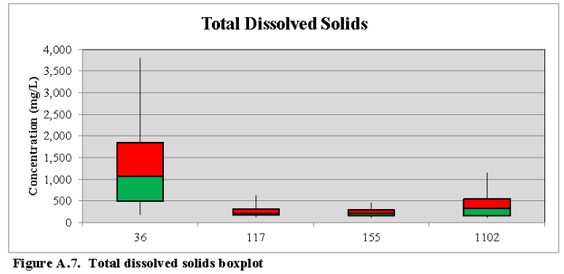


Figure A.7. Total dissolved solids boxplot

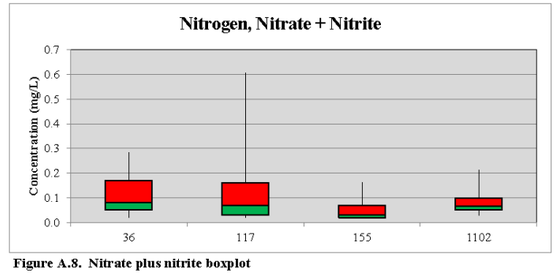


Figure A.8. Nitrate plus nitrite boxplot

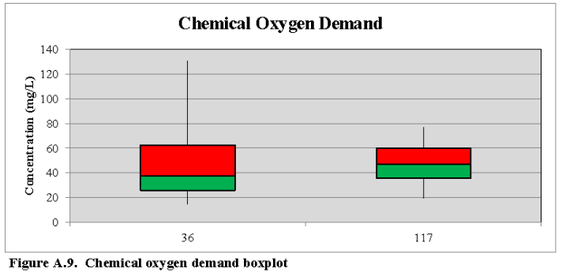


Figure A.9. Chemical oxygen demand boxplot

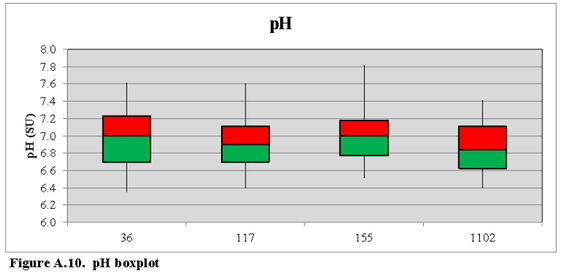


Figure A.10. pH boxplot

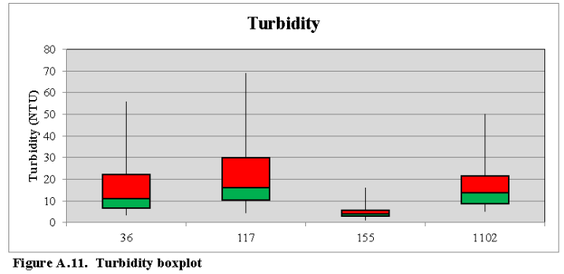


Figure A.11. Turbidity boxplot

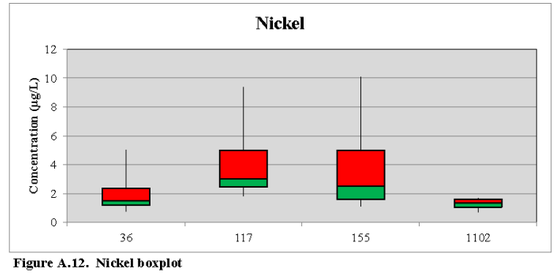


Figure A.12. Nickel boxplot

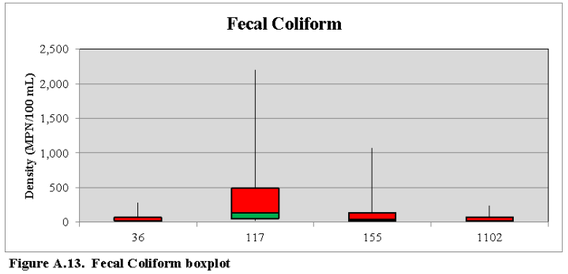


Figure A.13. Fecal Coliform boxplot

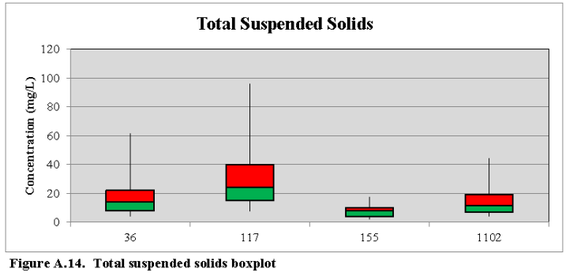


Figure A.14. Total suspended solids boxplot

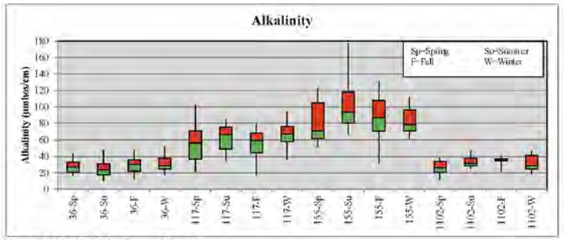


Figure A.15. Alkalinity seasonal boxplot

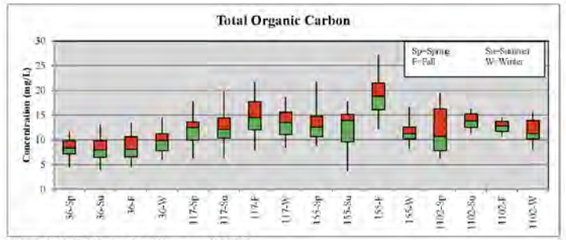


Figure A.16. Total organic carbon seasonal boxplot

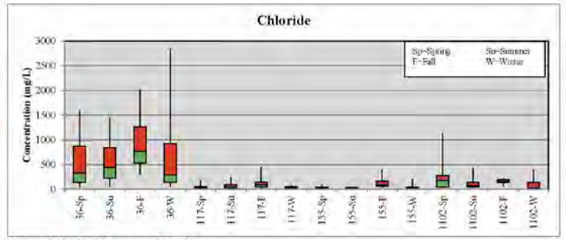


Figure A.17. Chloride seasonal boxplot

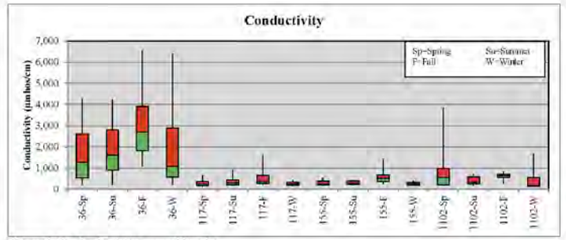


Figure A.18. Conductivity seasonal boxplot

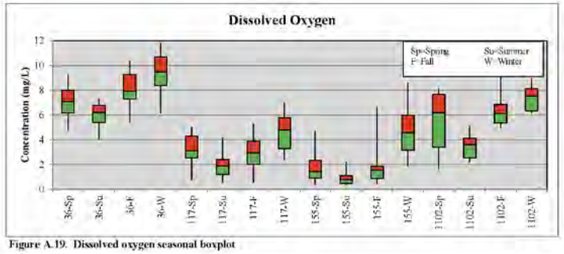


Figure A.19. Dissolved oxygen seasonal boxplot

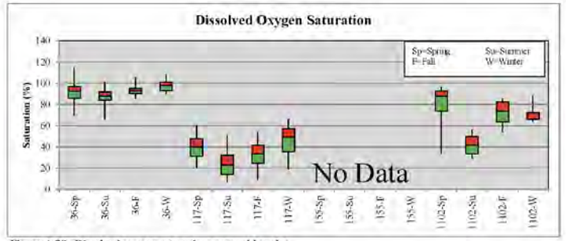


Figure A.20. Dissolved oxygen saturation seasonal boxplot

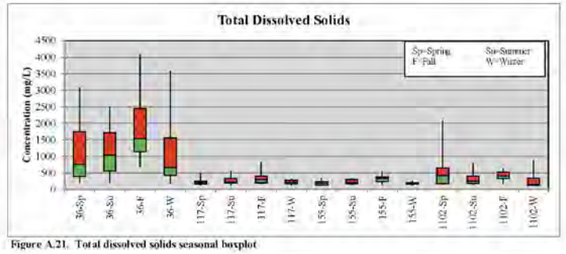


Figure A.21. Total dissolved solids seasonal boxplot

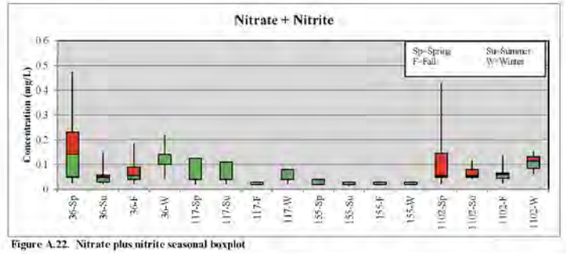


Figure A.22. Nitrate plus nitrite seasonal boxplot

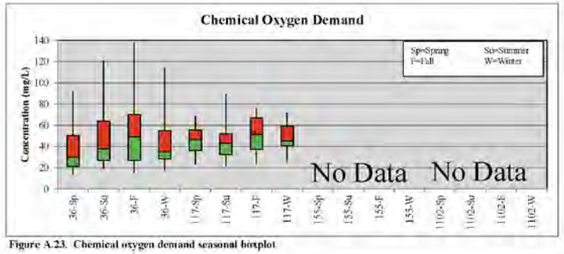


Figure A.23. Chemical oxygen demand seasonal boxplot

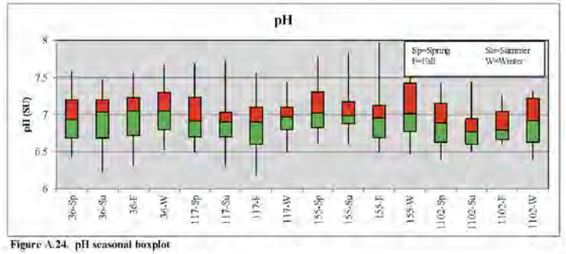


Figure A.24. pH seasonal boxplot

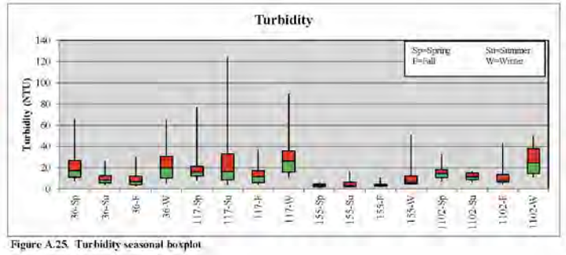


Figure A.25. Turbidity seasonal boxplot

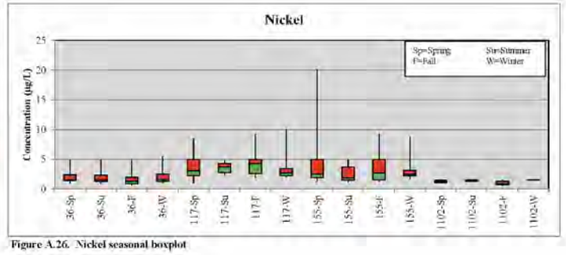


Figure A.26. Nickel seasonal boxplot

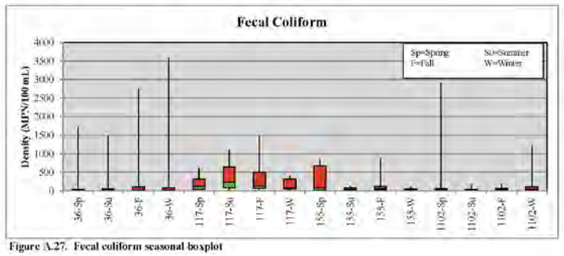


Figure A.27. Fecal coliform seasonal boxplot

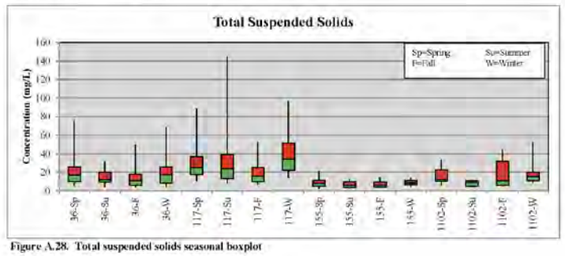


Figure A.28. Total suspended solids seasonal boxplot

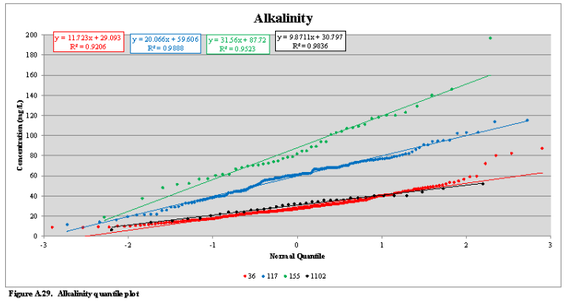


Figure A.29. Alkalinity quantile plot

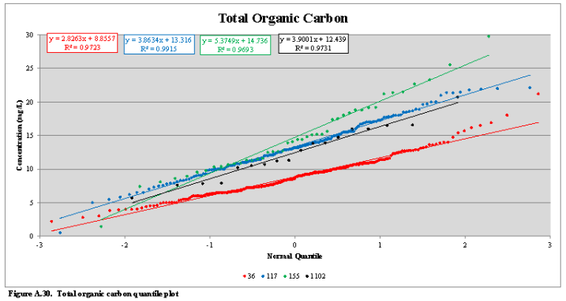


Figure A.30. Total organic carbon quantile plot

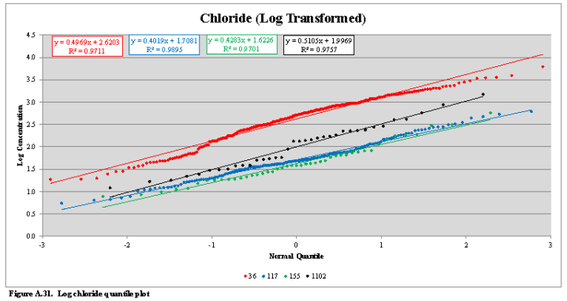


Figure A.31. Log chloride quantile plot

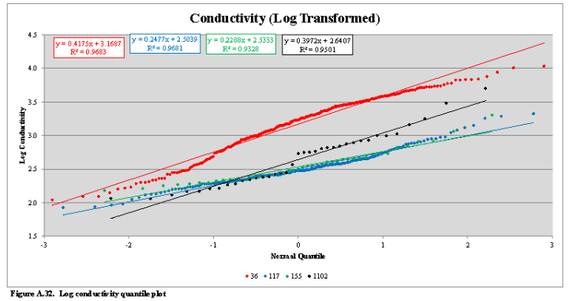


Figure A.32. Log conductivity quantile plot

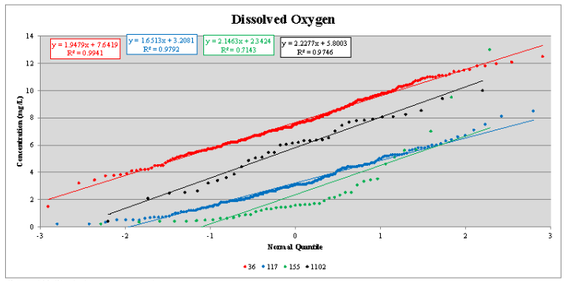


Figure A.33. Dissolved oxygen quantile plot

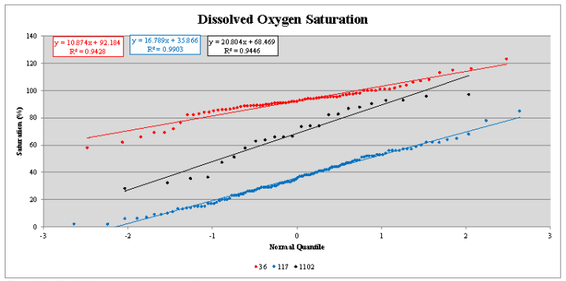


Figure A.34. Dissolved oxygen saturation quantile plot

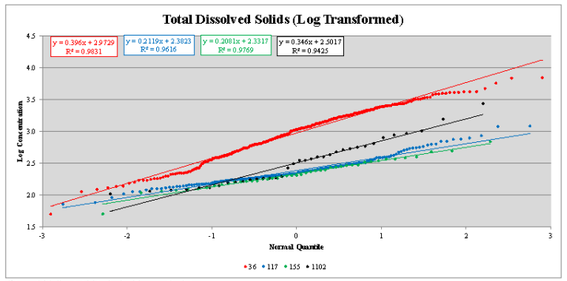


Figure A.35. Log total dissolved solids quantile plot

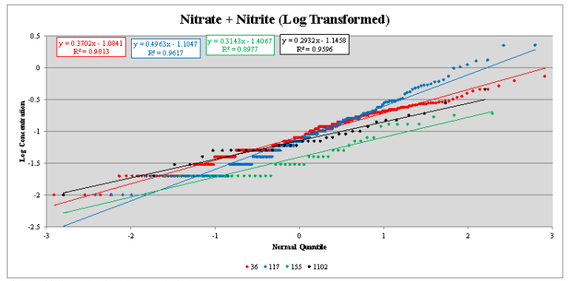


Figure A.36. Log nitrate plus nitrite quantile plot

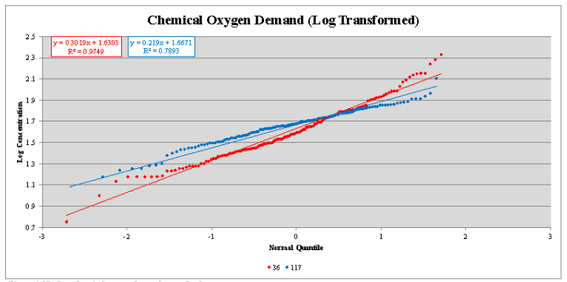


Figure A.37. Log chemical oxygen demand quantile plot

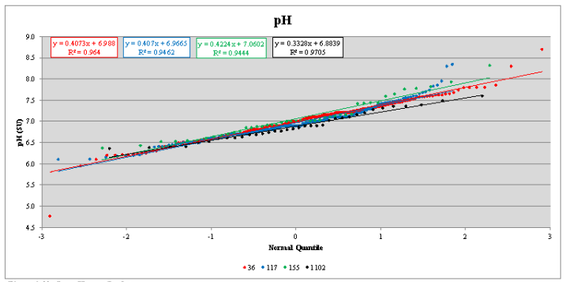


Figure A.38. Log pH quantile plot

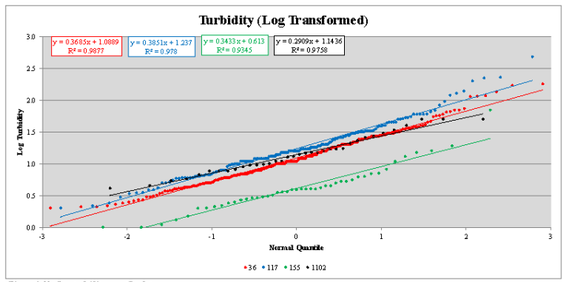


Figure A.39. Log turbidity quantile plot

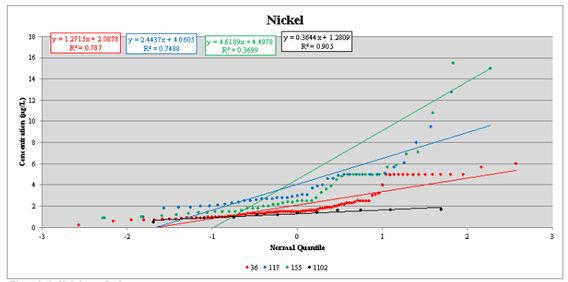


Figure A.40. Nickel quantile plot

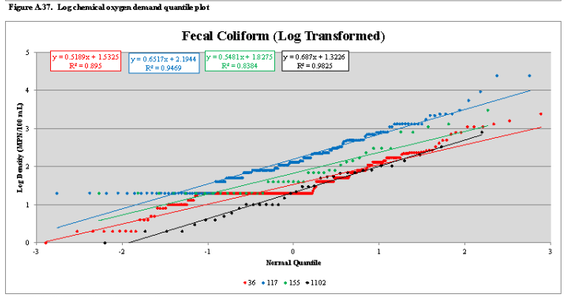


Figure A.41. Log Fecal Coliform quantile plot

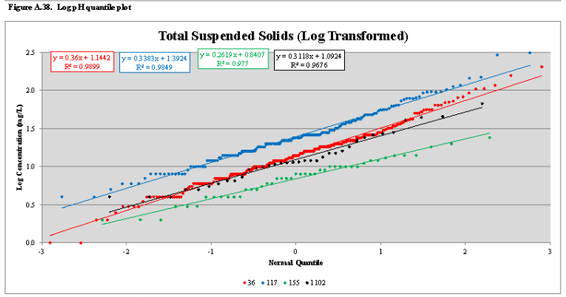


Figure A.42. Log total suspended solids quantile plot

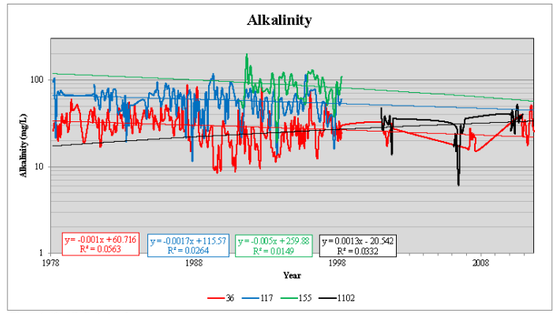


Figure A.43. Alkalinity trend

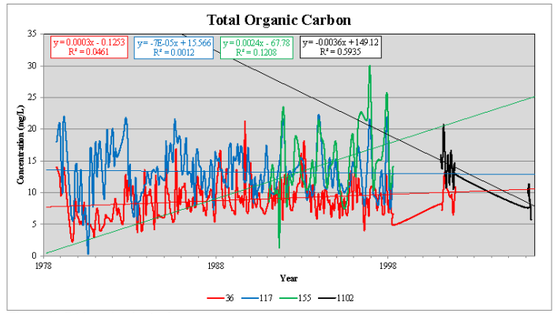


Figure A.44. Total organic carbon trend

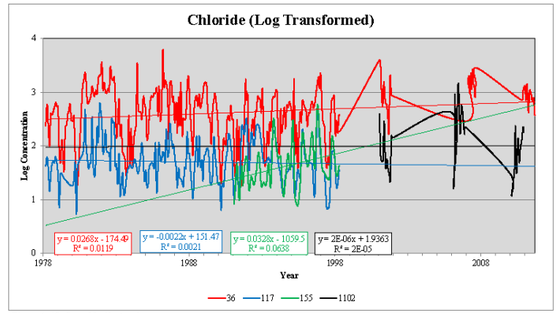


Figure A.45. Log chloride trend

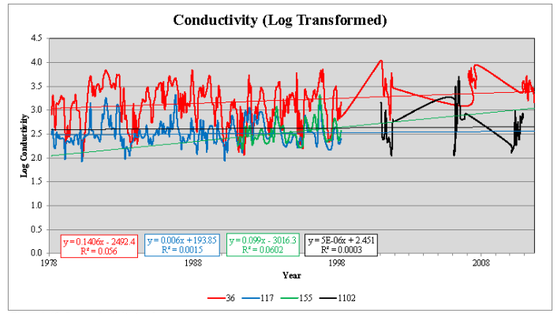


Figure A.46. Log conductivity trend

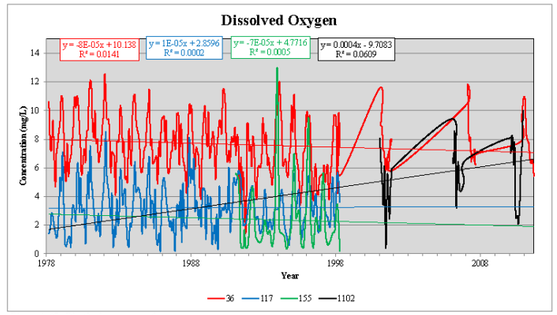


Figure A.47. Dissolved oxygen trend

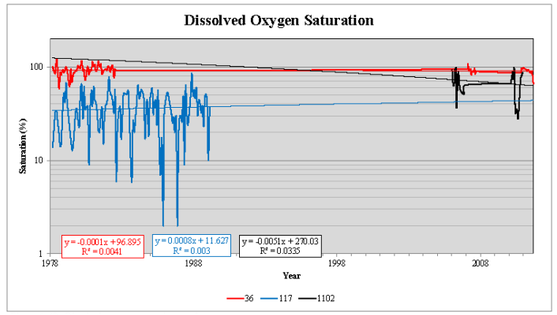


Figure A.48. Dissolved oxygen saturation trend

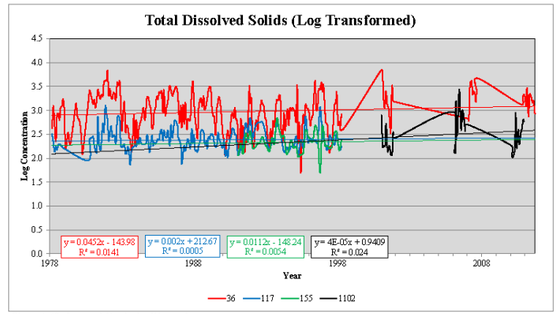


Figure A.49. Log total dissolved solids trend

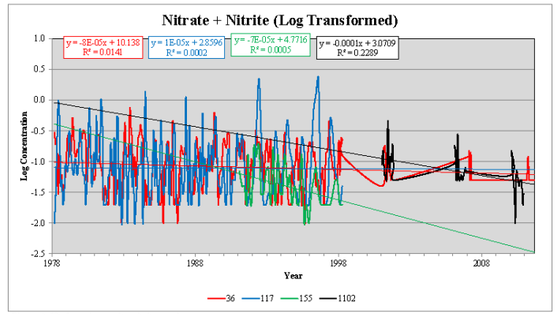


Figure A.50. Log nitrate plus nitrite trend

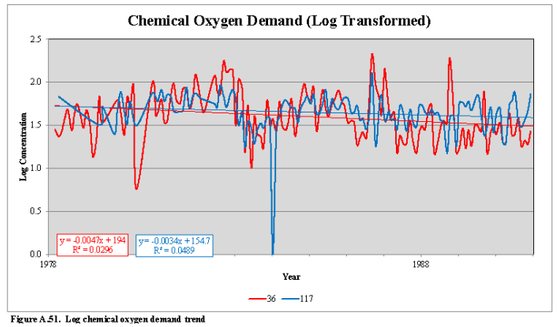


Figure A.51. Log chemical oxygen demand trend

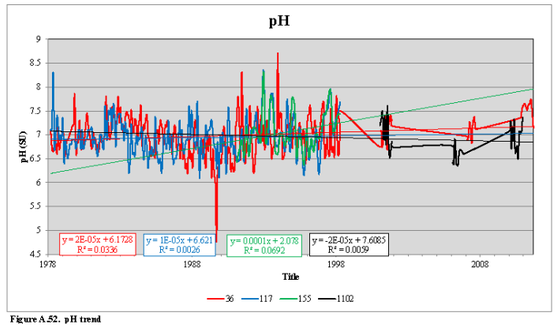


Figure A.52. pH trend

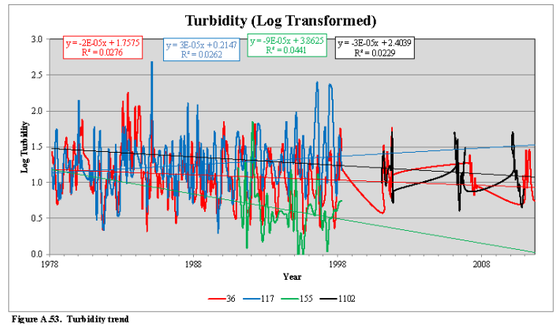


Figure A.53. Turbidity trend

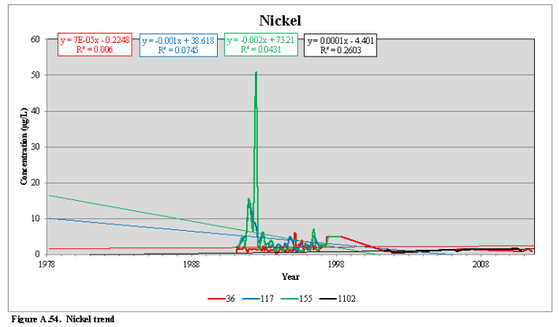


Figure A.54. Nickel trend

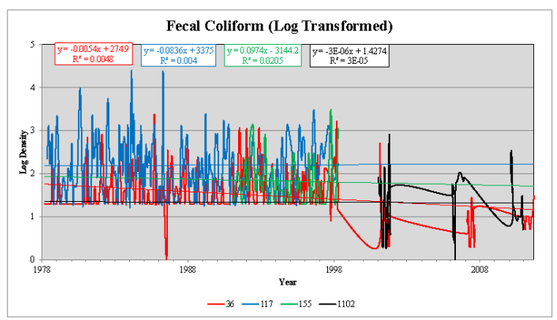


Figure A.55. Log fecal coliform trend

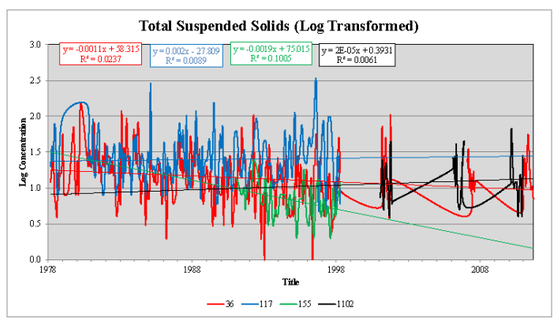


Figure A.56. Log total suspended solids trend

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex N

Threaten and Endangered Species Coordination

From:	Breaux, Catherine M MVN
To:	Dayan, Nathan S MVN; Walther, David
Cc:	Stiles, Sandra E MVN; Gilmore, Tammy H MVN
Subject:	RE: Change to the mitigation plan. (UNCLASSIFIED)
Date:	Monday, May 12, 2014 9:49:52 AM

Classification: UNCLASSIFIED
Caveats: NONE

Nathan,

Thanks for continuing to coordinate with us. As stated below the mitigation plan has been changed to eliminate the Milton component and replacing those mitigation needs by expanding the Lutcher Farmland component. The Service agrees with this change and has no need to develop a Supplemental FWCA letter in response to this mitigation change. We appreciate your continued coordination in regards to the Sprague's pipit.

Thanks,

Cathy Breaux (CEMVN-PD-P)
Fish and Wildlife Service
PO Box 60267
(504) 862-2689
(504) 862-1892

-----Original Message-----
From: Dayan, Nathan S MVN
Sent: Saturday, May 10, 2014 4:55 PM
To: Breaux, Catherine M MVN; Walther, David
Cc: Stiles, Sandra E MVN; Gilmore, Tammy H MVN
Subject: Change to the mitigation plan. (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Cathy/Dave
Please see the update mitigation plan. The Milton component was eliminated and the equivalent AAAHUs (131) were found by expanding the Lutcher Farmland component. 445 acres of open water will not be converted to swamp rather an additional 302 acres of farmland (348 total acres) will be converted to swamp.

We have determined that the farm fields may be suitable habitat for the candidate species Sprague's pipit. If any of these birds are present they would be forced to permanently relocate. The USACE will consult with USFWS when the species is listed.

Please inform us if an this change will require an addendum to Final CAR? If so I really need it by Wed morning.

Nathan Dayan
Fishery Biologist
RTS Environmental Compliance
US Army Corps of Engineers
New Orleans District
504-862-2530

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

May 7, 2014

Ms. Joan M. Exnicios
Chief, New Orleans Environmental Planning Branch
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Ms. Exnicios:

Please reference your office's April 7, 2014, electronic mail requesting our concurrence with your revised determination that implementation of the proposed West Shore of Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study (WSLP) and its' associated mitigation is not likely to adversely affect any threaten or endangered species or their critical habitat. This letter provides our comments in accordance with provisions of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), and the Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.).

We concur with you determination that the proposed project is not likely to adversely affect the West Indian manatee and Gulf sturgeon because they are unlikely to be encountered in the habitat impacted by the proposed project (primarily forested wetlands). Subsequently, ESA consultation should be reinitiated should the proposed project features change significantly or are not implemented within one year of the last ESA consultation with this office to ensure that the proposed project does not adversely affect any federally listed threatened or endangered species or their habitat.

Because all of the proposed sites are in areas where bald eagles and/or water birds may nest, we recommend that a qualified biologist inspect the proposed mitigation sites for the presence of undocumented nesting sites during the nesting season during future planning phases. In addition, we recommend prior to any work on-site contract personnel be informed of the need to identify nesting birds and their nests, and should avoid affecting them during the breeding season. If nests are located you should contact our office for additional information on measures necessary to avoid impacting such nesting sites.

We will continue to work closely with your staff to ensure that fish and wildlife resources are conserved. Toward that end, please have your staff advise Mr. David Walther (337/291-3122) if you or your staff has any questions regarding this matter.

Sincerely,

Jeffrey D. Weller
Field Supervisor
Louisiana Ecological Services Office

cc: LA Dept. of Wildlife and Fisheries, Baton Rouge, LA

From: Gilmore, Tammy H MVN
To: Walther, David; Breaux, Catherine M MVN
Subject: WSLP T&E coordination
Date: Monday, April 07, 2014 11:27:00 AM
Attachments: revised WSLP T&E coordination.docx

Cathy and Dave,

Based on review of existing data, it is the opinion of Corps of Engineers New Orleans District (CEMVN) that implementation of the WSLP HSDRR project, as revised, is not likely to adversely affect any known threatened or endangered species, critical habitat, Bald eagles or colonial nesting water birds. Please review the information attached and inform us whether or not you agree with our finding.

Thanks,

Tammy Gilmore
Biologist/Environmental Resource Specialist
US Army Corps of Engineers, New Orleans District
(504) 862-1002

West Shore-Lake Pontchartrain, Louisiana
Hurricane and Storm Damage Risk Reduction (HSDRR) Project

Project Description

The final selected risk reduction system for the WSLP study includes the construction of an 18.27-mile (96,481 ft) levee system around the communities of Montz, Laplace, Reserve and Garyville. The levee system would consist of earthen levees, floodwalls (T-Walls), floodgates, drainage canals, flood side ditch for hydraulic connectivity for wetlands north and south of the recommended plan, drainage structures and pump stations located along the alignment. The final selected risk reduction system also includes the construction of nonstructural components in St. James Parish consisting of berms, culverts with flap gates and raising of structures. A mitigation plan has been developed to address the direct impacts to approximately 1,236 acres of forested wetlands and the associated indirect impacts.

Structural

The construction of the levee system would begin at the upper guide levee of the Bonnet Carre Spillway, north of an underground utility pipeline right of way and US-61. The levee would head northwest paralleling the pipeline right of way and pass under I-10. Past I-10 the levee would enclose the I-10 and I-55 interchange and cross US-51. It would then track north of I-10 and a pipeline transmission corridor. Past the Belle Terre/I-10 exit, the levee would pass back under I-10 and parallel the pipeline corridor through wetlands until it crosses Hope Canal. The levee would then turn south; cross the pipeline transmission corridor and then extend to the Mississippi River Levee System (MRL).

Non-structural

The non-structural components would consist of three Polders, flood control under LA 3125 and raising of structures. Polder 1 would consist of a 10,086 lf nonstructural berm In the Gramercy area, north of Hwy 3125. The berm would also include two floodgates to allow existing drainage to flow through the berm when not under surge events. A temporary system pump, approximately 217 cfs, would be included as part of the nonstructural berm system to remove any rainfall during the surge event.

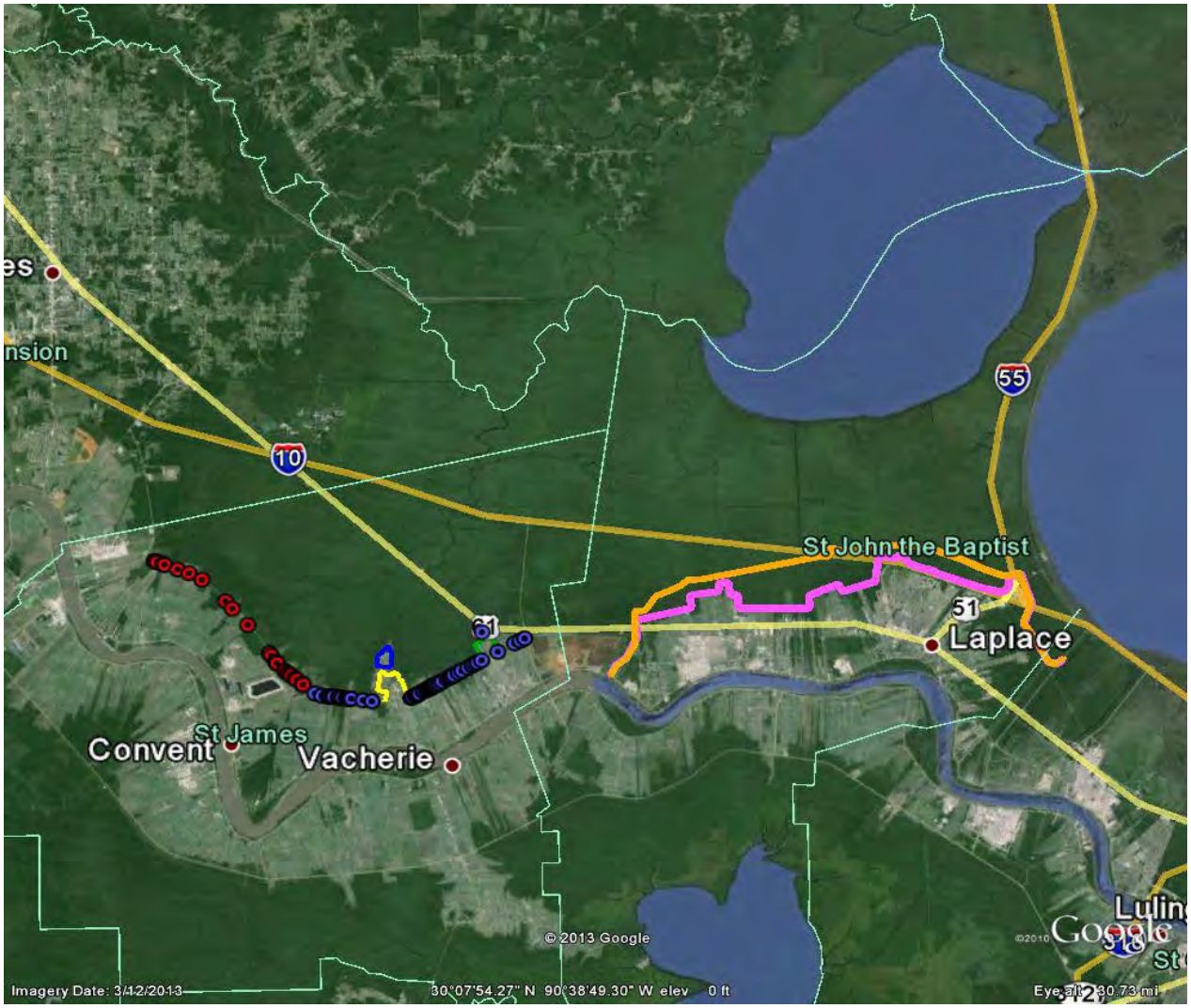
Polder 2, called~~,~~ Grand Point South would tie into HWY 3125. The berm would be 14,488 lf. The berm would also include one floodgate to allow existing drainage to flow through the berm when not under surge events. A temporary system pump, approximately 382 cfs, would be included as part of the nonstructural berm system to remove any rainfall during the surge event.

Polder 3 consists of a 10,314 lf complete ring berm around the structures in the northern portion of Grand Point. A temporary system pump, approximately 140 cfs, would be included as part of the nonstructural berm system to remove any rainfall during the surge event.

The flood control under LA 3125 would consitst of 145 flap gate culvert closures, two flood gates and two small berms. The total length of these berms are approximately 645 lf.

33 structures with a first floor elevation less than the 6.5 ft NAVD 88 would be outside of the previously discussed non-structural features. These 33 structures would be raised to the stage associated with the 2070 100-year event.

Structural and Non-structural Project Features



Mitigation Plan

Proposed Mitigation Components	Acres
Bonnet Carre Bottomland Hardwood Restoration	156
Swamp Mitigation Bank Credit Purchase	n/a
Blind River Swamp Restoration	1,040
Bonnet Carre Swamp Restoration	310
Maurepas Crawfish Ponds Restoration	1,161
Milton Island Swamp Restoration	445
Lutcher Polder Farmlands Swamp Restoration	46
Total	3,158

Bonnet Carre Bottomland Hardwood Restoration (Figure K-1)

- Clear and grub woody vegetation within the mitigation sites before fill placement. This includes mechanized removal of invasive and nuisance plants. Degrade certain existing earthen mounds and ridges within each site to the final target grade elevation. Perimeter ridges at each site will be left in place at this stage to serve as containment berms.

- Eradicate invasive/nuisance plant species within the sites through groundbased application of appropriate herbicides to the target species, prior to fill placement. Follow-up eradication before initial planting of native species within these features, as necessary.

- Placement of fill within the sites as necessary to attain the desired final target grade elevation of approximately 1.5 feet NAVD88. The fill material would be dredged from within the Project right of way and hauled in trucks to the mitigation site.

- Final grading within the mitigation features after the fill deposited in these features has settled to the desired final target elevation, prior to initial planting of the features. This grading will be performed to remove any earthen ridges that remain projecting above the target grade elevation, thereby creating a relatively level surface.

- Plant native BLH canopy and midstory species in the sites.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

- As necessary, follow-up eradication of invasive/nuisance plant species through ground-based application of appropriate herbicides. There will likely be multiple eradication events performed during various years after construction.

Swamp Mitigation Bank Credit Purchase

Before the first levee construction contract is advertised, available mitigation banks and credits will be assessed to compensate for a portion of swamp impacts. The amount of credits purchased may be more or less than currently identified in Table K-2. If more credits are available then more may be purchased. If fewer credits are available then additional plans will be developed to construct mitigation projects. Specific monitoring of mitigation success criteria following acquisition of bank credits will be conducted in accordance with the terms of the applicable Mitigation Banking Instrument.

Blind River Swamp Restoration (Figure K-2)

- Verify that the Livingston Parish CIAP project was built, and that those hydraulic modifications when combined with this planting plan will produce the proposed AAHUs. If this is not verified then the details of the mitigation measure will be revised to accomplish the required mitigation.

- Plant native swamp canopy and midstory species on 1,040 acres.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

Bonnet Carre Swamp Restoration (Figure K-1)

- Clear and grub woody vegetation within the sites before fill placement. This will include mechanized removal of invasive and nuisance plant species. Degrade certain existing earthen mounds and ridges within each site to the final target grade elevation. Perimeter ridges at each site will be left in place at this stage to serve as containment berms.

- Eradicate invasive/nuisance plants within the sites through groundbased application of appropriate herbicides to the target species, prior to fill placement. Follow-up eradication before the initial planting of native swamp species within these features, as necessary.

- Place fill in the mitigation sites to a final target grade elevation of approximately 0.5 feet NAVD88. Use fill material obtained from the Project levee right of way

- Final grading within the sites after the fill deposited in these features has settled to the desired final target elevation, prior to initial planting of the features. This grading will be performed to remove any earthen ridges that remain projecting above the target grade elevation, thereby creating a relatively level surface in the mitigation features.

- Follow-up eradication before the initial planting of native swamp species within these features, as needed. There will likely be multiple invasive/nuisance plant species eradication events during various years after the initial planting event. These may take place even beyond the attainment of the initial success criteria.

- Plant native swamp canopy and midstory species in the sites after final grading.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

- As necessary, follow-up eradication of invasive/nuisance plant species through ground-based application of appropriate herbicides. There will likely be multiple eradication events performed during various years after construction.

<u>Maurepas Crawfish Ponds Restoration (Figure K-3)</u>

- Clear and grub woody vegetation within the sites before grading. This will include mechanized removal of invasive and nuisance plant species.

- Degrade existing earthen mounds and levees within each site to a final target elevation approximately 0.5 feet NAVD88. Grading will remove former water management levees that were used to manage the crawfish ponds. Removal of these levees is intended to create a uniform elevation and to enable open exchange of water with adjacent swamps.

- Eradicate invasive/nuisance plants within the sites through groundbased application of appropriate herbicides to the target species. Follow-up eradication before the initial planting of native swamp species as necessary.

- Plant 1,161 acres with native swamp canopy and midstory species after grading.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

- As necessary, follow-up eradication of invasive/nuisance plant species through ground-based application of appropriate herbicides. There will likely be multiple eradication events performed during various years after construction.

Milton Island Swamp Restoration (Figure K-4)

- Construct containment dikes around the restoration site.

- Dredge material from Lake Pontchartrain and pump it to the restoration site. Place fill in the mitigation sites to a final target grade elevation of approximately 0.5 feet NAVD88.

- Eradicate any invasive/nuisance plants within the site through groundbased application of appropriate herbicides to the target species.

- Plant 445 acres of native swamp canopy and midstory species.
- Install nutria guards on all planted trees to protect against herbivore tree loss.

Lutcher Polder Farmlands Swamp Restoration (Figure K-5)

- Clear and grub woody vegetation within the sites before grading. This will include mechanized removal of invasive and nuisance plant species.

- Mechanically grade sites to a final target elevation approximately 0.5 feet NAVD88.

- Degrade existing earthen mounds and levees within each site to a final target elevation approximately 0.5 feet NAVD88. Grading should remove former water management levees that were used in the crawfish ponds. Removal of these levees is intended to create uniform elevation and to enable open exchange of water with adjacent swamps.

- Eradicate invasive/nuisance plants within the sites through groundbased application of appropriate herbicides to the target species. Follow-up eradication before the initial planting of native swamp species as necessary.

- Plant 46 acres with native swamp canopy and midstory species.

- Install nutria guards on all planted trees to protect against herbivore tree loss.

- As necessary, follow-up eradication of invasive/nuisance plant species through ground-based application of appropriate herbicides. There will likely be multiple eradication events performed during various years after construction.

Mitigation Project Location and Features

Figure K-1: Bonnet Carre Spillway Bottomland Hardwood Restoration and Bonnet Carre Spillway Swamp Restoration

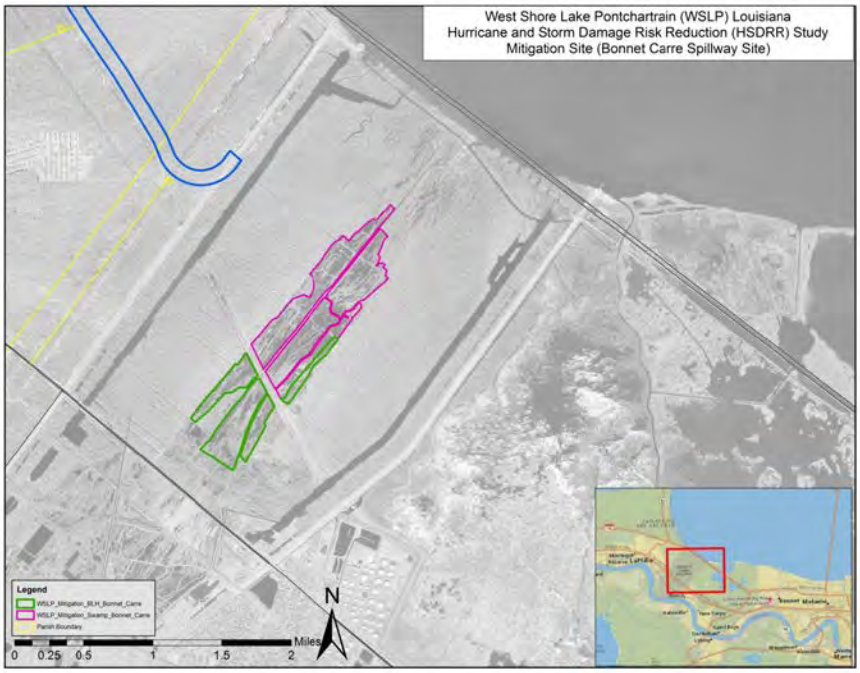


Figure K-2: Blind River Swamp Restoration

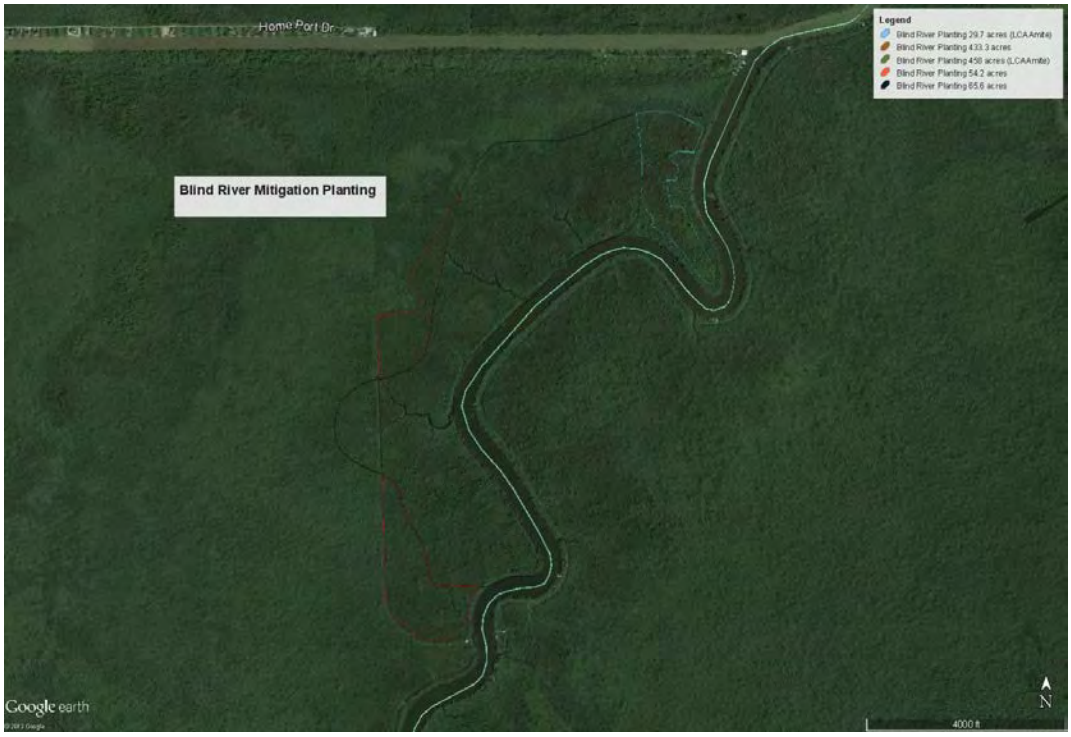


Figure K-3: Maurepas Crawfish Ponds Swamp Restoration

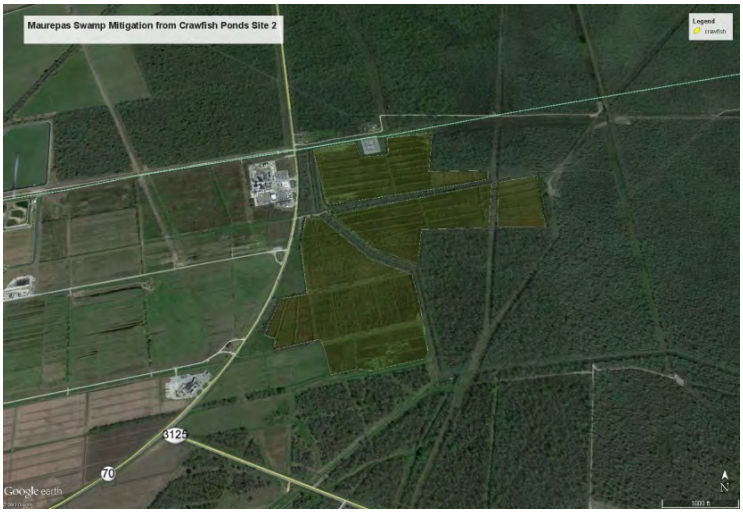


Figure K-4: Milton Island Swamp Restoration

Figure K-5: Lutcher Polder Farmland Swamp Mitigation

Impacts to Threatened and Endangered Species

Seven threatened and endangered species; the Gulf sturgeon (*Acipenser oxyrhynchus desotoi*), the West Indian manatee (*Trichechus manatus*), the green (*Chelonia mydas*), Hawksbill (*Eretmochelys imbricate*), Kemps (*Lepidochelys kempii*), Leatherback (*Dermochlys coriacea*) and Loggerhead (*Caretta caretta*) sea turtles one candidate species; the Spraque's Pipit (*Anthus spragueii*) and one delisted species; the bald eagle (*Haliaeetus leucocephalus*), are known to occur or occasionally enter the area. The area is also known to support colonial nesting water birds (e.g., herons, egrets, and others).

Based on review of existing data, preliminary field surveys, the rarity of occurrences and the use of BMPs, CEMVN has determined that alternative C is not likely to adversely affect any of the listed species or their critical habitat, bald eagles or colonial nesting water birds. The Amite River Diversion Canal (ARDC) Modification, Louisiana Coastal Area, EIS, LPV Mitigation PIER #36, and LPV Mitigation at Milton TIER #36, along with the associated T&E coordination were utilized to determine the effects of the mitigation plan at Amite, Bonnet Carre and Milton Island and are therefore incorporated by reference in the WSLP EIS.

Alternative C would directly impact (destroy) the following acres of habitats potentially utilized by listed species, the bald eagle and colonial nesting water birds: a total of 1,236 acres of primarily forested wetlands along the reach of the proposed structural alignment and 1 acre associated with the non-structural features. Other, adjacent forested wetlands and swamp habitats are available for use by listed species, the bald eagle and colonial nesting water birds. Direct impacts associated with the mitigation for the proposed project would be the temporary and localized displacement of listed species, colonial nesting water birds and bald eagles during construction of BLH and swamp habitats. Once final plantings are complete, these newly constructed habitats would be available for use by these species.

There are existing bald eagle nests in the area; however, based on information provided by USFWS, all nests are beyond 1,500 feet from the proposed project alignments. Two potentially active water bird rookeries exist within 1,000 feet of the proposed alignments. Before construction the USFWS and CEMVN will survey the area to confirm if the rookeries are active or not. USFWS guidelines would be utilized during construction to avoid any impacts to the above described species, if encountered.

Alternative C could potentially indirectly degrade up to approximately 8,887 acres of primarily forested wetlands/swamp habitats potentially utilized by listed species, the bald eagle and colonial nesting water birds. However, preliminary hydrologic modeling indicates that the project design would have minimal changes to flows or stages on either the protected or unprotected sides. Access into and out of the project area would not be significantly impacted for the bald eagle or colonial nesting water birds. Gulf sturgeon and the West Indian Manatee would be temporarily restricted from entering the proposed action area on average about 8.5 days per year due to closing gates and culverts in preparation for storm surge events. However, it is highly unlikely that these species would navigate these routes considering the location and the shallow water conditions in the area where the gates and culverts would be constructed. The indirect impacts resulting from mitigation would be the benefit of restoring approximately 3,002 acres of swamp habitat and 156 acres of BLH habitat for utilization by colonial nesting water birds and bald eagles. BMPs and guidelines from USFWS and NMFS would be followed in order to avoid and minimize any impacts to the manatee, Gulf sturgeon and sea turtles.

MIGRATORY BIRD TREATY ACT and

BALD AND GOLDEN EAGLE PROTECTION ACT

BEST MANAGEMENT PRACTICES

Colonial nesting wading birds (including but not limited to, herons, egrets, and Ibis), seabirds/water-birds (including, but not limited to terns, gulls, Black Skimmers, and Brown Pelicans) and bald eagles are known to roost, forage and nest in the project area. The birds and their nests are protected by the Migratory Bird Treaty Act (MBTA) and must not be disturbed or destroyed. As such, in areas near known rookeries, nesting prevention measures may be necessary in order to insure the success of the nesting season. These measures would be developed by CEMVN in coordination with USFWS and LDWF and would be implemented by a trained biologist. The nesting activity period extends from 15 February through 1 September for colonial nesting wading and seabirds/water birds, and September to May for bald eagles. Therefore, the nesting prevention measures should begin well before February.

CEMVN and USFWS biologists will conduct surveys prior to construction to determine the presence and/or location of any eagle's nests, colonial nesting wading/water birds and/or rookeries and if nesting prevention measures would be necessary. Nest prevention measures shall be intended to deter birds from nesting within applicable the designated buffer zone of construction areas without physically harming birds or disturbing any existing nests. Nest prevention measures may be used in combination and/or adjusted to be most effective.
At minimum, nest prevention measures shall include, but not be limited to the following:

- Flagging/Streamers
- Vehicular/Pedestrian Traffic
- Clapping and Yelling
- Horn Blowing

Once work has commenced, the presence of nesting eagles, wading birds and/or seabirds/water-birds within the minimum distances from the work area, as specified in paragraph entitled "No Work Distances", shall be immediately reported to the Environmental Technical Manager, Ms. Tammy Gilmore, of the U.S. Army Corps of Engineers at (504) 862-1002 email address tammy.h.gilmore@usace.army.mil

No Work Distances

No-work distance restrictions are as follows:

- o Terns, Gulls, and Black Skimmers -650 feet;
- o Colonial nesting wading birds -1,000 feet; and,
- o Brown Pelicans -2,000 feet; and,
- o Bald Eagles -660 feet.

Coordination by the New Orleans District personnel with the U.S. Fish and Wildlife Service may result in a reduction or relaxing of these no-work distances depending on the species of birds found nesting at the work site and specific site conditions.

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex O

Air Quality Analysis

From:	Linda (Brown) Hardy
To:	"Joseph.musso@usace.army.mil"; Dayan, Nathan S MVN
Cc:	Yasoob Zia
Subject:	[EXTERNAL] DEQ SOV 140428/0520 Crawfish Pond #1 and Blind River Projects
Date:	Friday, May 16, 2014 9:37:40 AM

May 16, 2014

Joan M. Exnicios, Chief

USACE Environmental Compliance Branch

P.O. Box 60267

New Orleans, LA 70160-0267

Joseph.musso@usace.army.mil <mailto:Joseph.musso@usace.army.mil>

Nathan.S.Dayan@usace.army.mil

RE: 140428/0520

Crawfish Pond #1 and Blind River Projects

Army Corps of Engineers Funding

Ascension & Livingston Parishes

Dear Ms. Exnicios:

The Department of Environmental Quality (LDEQ), Business and Community Outreach Division has received your request for comments on the above referenced project.

After reviewing your request, the Department has no objections based on the information provided in your submittal. However, for your information, the following general comments have been included. Please be advised that if you should encounter a problem during the implementation of this project, you should immediately notify LDEQ's Single-Point-of-contact (SPOC) at (225) 219-3640.

· Please take any necessary steps to obtain and/or update all necessary approvals and environmental permits regarding this proposed project.

* If your project results in a discharge to waters of the state, submittal of a Louisiana Pollutant Discharge Elimination System (LPDES) application may be necessary.
* If the project results in a discharge of wastewater to an existing wastewater treatment system, that wastewater treatment system may need to modify its LPDES permit before accepting the additional wastewater.

* All precautions should be observed to control nonpoint source pollution from construction activities. LDEQ has stormwater general permits for construction areas equal to or greater than one acre. It is recommended that you contact the LDEQ Water Permits Division at (225) 219-9371 to determine if your proposed project requires a permit.

· If your project will include a sanitary wastewater treatment facility, a Sewage Sludge and Biosolids Use or Disposal Permit application or Notice of Intent may be required. Additional information may be obtained on the LDEQ website at http://www.deq.louisiana.gov/portal/tabid/2296/Default.aspx <http://www.deq.louisiana.gov/portal/tabid/2296/Default.aspx> or by contacting the LDEQ Water Permits Division at (225) 219- 9371.

* If any of the proposed work is located in wetlands or other areas subject to the jurisdiction of the U.S. Army Corps of Engineers, you should contact the Corps directly regarding permitting issues. If a Corps permit is required, part of the application process may involve a water quality certification from LDEQ.
* All precautions should be observed to protect the groundwater of the region.
* Please be advised that water softeners generate wastewaters that may require special limitations depending on local water quality considerations. Therefore if your water system improvements include water softeners, you are advised to contact the LDEQ Water Permits to determine if special water quality-based limitations will be necessary.
* Any renovation or remodeling must comply with LAC 33:III.Chapter 28, Lead-Based Paint Activities; LAC 33:III.Chapter 27, Asbestos-Containing Materials in Schools and State Buildings (includes all training and accreditation); and LAC 33:III.5151, Emission Standard for Asbestos for any renovations or demolitions.
* If any solid or hazardous wastes, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, notification to LDEQ's Single-Point-of-Contact (SPOC) at (225) 219-3640 is required. Additionally, precautions should be taken to protect workers from these hazardous constituents.

Currently, Ascension and Livingston Parishes are classified as nonattainment with the National Ambient Air Quality Standards. However, since your general conformity determination shows that the proposed VOC and NOx emissions will be less than the de minimis levels, the Department has no objections to implementation of this project.

Please send all future requests to my attention. If you have any questions, please feel free to contact me at (225) 219-3954 or by email at linda.hardy@la.gov.

Sincerely,

Linda M. Hardy

Technical Assistant to the Deputy Secretary

Louisiana Department of Environmental Quality

Office of the Secretary

P.O. Box 4301

Baton Rouge, LA 70821-4301

Ph: (225) 219-3954

Fax: (225) 219-3971

Email: linda.hardy@la.gov <mailto:linda.hardy@la.gov>

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

APR 10 2014

Regional Planning and
Environment Division, South
Coastal Environmental
Compliance Branch

Ms. Linda Hardy
LA Department of Environmental Quality
Office of the Secretary
Business and Community Outreach and Incentives Division
P. O. Box 4301
Baton Rouge, LA 70821-4301

Dear Ms. Hardy:

The U.S. Army Corps of Engineers (Corps) is proposing a hurricane and storm damage risk reduction project that consists of constructing earthen levees, concrete floodwalls, floodgates, pump stations, and drainage structures. All of the construction features are located in areas that are in attainment status for air quality. In addition, the Corps proposes several mitigation features that will accompany the construction features. Two of the mitigation features are located in parishes that are in non-attainment status for ozone. They are the Maurepas Crawfish Pond #1 site in Ascension Parish and the Blind River site in Livingston Parish. Both Ascension and Livingston Parishes are two of the five parishes in Louisiana that have been designated by the U.S. Environmental Protection Agency as non-attainment areas for ozone. Since the proposed federal activities in the ozone non-attainment area are subject to the State's general conformity regulations as promulgated under LAC 33:III.14.A, Determining Conformity of General Federal Actions to State or Federal Implementation Plans, a general conformity applicability determination has been made by estimating the total of direct and indirect volatile organic compound (VOC) and nitrogen oxide (NO_X) emissions that may be created during the mitigation projects. Enclosed are the calculations for VOC and NO_X emissions for the proposed mitigation projects in the ozone non-attainment areas.

The Crawfish Pond #1 mitigation project includes the use of a diesel-powered backhoe and bull dozers along with gasoline-powered all-terrain vehicles to create swamp-like conditions. The Blind River mitigation project includes the use of gasoline-powered boats to transport personnel and equipment to the site in order to hand-plant a variety of trees. The attached calculations presume both mitigation projects would be completed within one year. As calculated, the Crawfish Pond #1 mitigation project in Ascension Parish and the Blind River mitigation project in Livingston Parish would each produce a total of less than one ton of VOC and NO_X emissions which is far below the 100 tons per year *de minimis* threshold.

We respectfully request that you review the attached information and offer your comments so that we may move forward with the proposed mitigation projects. If you have any questions regarding the air quality information, please contact Mr. Joseph Musso of our Coastal Environmental Compliance group at (504) 862-2280.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

Attachments

West Shore Lake Pontchartrain
Maurepas Crawfish Pond #1 Mitigation Site
Ascension Parish, LA

Table 1
Combustible Emissions

Assumptions for Combustible Emissions					
Type of Construction Equipment	Number of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Diesel Backhoe	1	168	8	15	20160
Diesel Bull Dozer	2	145	8	35	81200

Assumptions for Combustible Emissions				
Type of Construction Equipment	Number of Units	miles/day	days/yr	Total miles/yr
All Terrain Vehicle	6	5	39	1170

Table 2
Emission Factors for Compression Ignition Engines

Type of Construction Equipment	VOC g/hp-hr	NOx g/hp-hr	VOC lbs/hp-hr	NOx lbs/hp-hr
Diesel Backhoe	0.338	5.652	0.0007	0.0124
Diesel Bull Dozer	0.338	5.652	0.0007	0.0124

Emission Factors for Spark Ignition Engines

Type of Construction Equipment	VOC g/mile	NOx g/mile	VOC lbs/mile	NOx lbs/mile
All Terrain Vehicle	2.400	0.410	0.0053	0.0009

Convert grams to pounds: (g)x(.0022) = lbs
Emission Factors derived from the EPA's NONROAD2010 model

Table 3
Annual VOC and NOx Emissions Totals

Total Calculated Emissions			
Type of Construction Equipment		VOC tons/yr	NOx tons/yr
Diesel Backhoe		0.0071	0.1250
Diesel Bull Dozer		0.0284	0.5034
Gasoline All Terrain Vehicle		0.0031	0.0005
	TOTALS	0.0386	0.6289

Emissions Formula: (lbs/hp-hr)x(hp)x(hr/day)x(days/year)x(# units)/2000 lbs/ton = Tons/yr
Emissions Formula for ATV: (lbs/mile)x(miles/day)x(days/year)x(# units)/2000 lbs/ton = Tons/yr

NOTE: The listed equipment is the type and number of equipment that may typically be used at this type of wetlands construction project.

West Shore Lake Pontchartrain
Blind River Mitigation Site
Livingston Parish, LA

Table 1

Combustible Emissions

Assumptions for Combustible Emissions					
Type of Construction Equipment	Number of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Gasoline Outboard Motor	6	75	4	47	84600

Table 2

Emission Factors for Spark Ignition Engines

Type of Construction Equipment	VOC g/hp-hr	NOx g/hp-hr	VOC lbs/hp-hr	NOx lbs/hp-hr
Gasoline Outboard Motor	3.530	5.820	0.0078	0.0128

Convert grams to pounds: (g)x(.0022) = lbs

Emission Factors derived from the EPA's NONROAD2010 model

Table 3

Annual VOC and NOx Emissions Totals

Total Calculated Emissions			
Type of Construction Equipment		VOC tons/yr	NOx tons/yr
Gasoline Outboard Motor		0.3299	0.5414
	TOTALS	0.3299	0.5414

Emissions Formula: (lbs/hp-hr)x(hp)x(hr/day)x(days/year)x(# units)/2000 lbs/ton = Tons/yr

NOTE: The listed equipment is the type and number of equipment that may typically be used at this type of wetlands mitigation project.

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex P

USACE responses to Public Comments

***The Comments in this table have been given a Unique File Identifier and may be paraphrased or summarized. The full comment can be found in Annex Q - Public Comments and Public Meeting Transcripts, labeled with their appropriate Unique File Identifier**

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
CD _9-18-2013_1_David Vitter	What is a true timeline of when the project will start?	The project requires construction authorization and the appropriation of construction funds. A continuous funding stream is needed to complete this project within the anticipated timeline, which requires continuing appropriations from Congress and the State of Louisiana in order to fund the detailed design phase and fully fund construction contracts. Subject to project authorization, funding, and regulatory approval, the schedule assumes a complete risk reduction system in place by 2020, with additional levee lifts so that the entire system meets its initial risk reduction levels by year 2035.
CD _9-18-2013_1_David Vitter	Are public hearings being held and/or scheduled to allow input from landowners likely to be affected by the project?	The final feasibility study report and NEPA document, and the proposed Report of the Chief of Engineers, have currently been released for State and Agency review, as required by the Flood Control Act of 1944 as amended (33 U.S.C. 701-1). After the final review period is over and once the Chief of Engineers signs the report signifying approval of the project recommendation, the report is forwarded to the chairpersons of the Senate Committee on Environment and Public Works, and the House of Representatives Committee on Transportation and Infrastructure. The project recommendation is still subject to project authorization, funding, and regulatory approval before construction can begin. The Corp will continue to keep the public informed of actions through notices in local newspapers, on the Corps website, and on social media sites. In addition interested parties can be added to a mailing list and receive notices on anything the Corps does in a parish.
CD _9-18-2013_1_David Vitter	Is the project, in fact, going to necessitate the use of property that we currently own?	The project recommendation is subject to project authorization, funding and regulatory approval before final design plans and construction activities can begin. During the preconstruction and detailed engineering phase, the Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area of the recommended plan. Impacted landowners will be notified in writing, and will be offered fair market value for the land interest required for the project.
CD _9-18-2013_1_David Vitter	Can the proposed levee or wall be construction 1 mile closer towards Lake Pontchartrain or along the existing rail road line?	The project recommendation is subject to project authorization, funding and regulatory approval before final design plans and construction activities can begin. During the preconstruction and detailed engineering phase, the Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area of the recommended plan. Impacted landowners will be notified in writing, and will be offered fair market value for the land interest required for the project.
CD _9-18-2013_1_David Vitter	When, and in what manner, will I be notified as to any planned or proposed use of my property?	The project recommendation is subject to project authorization, funding and regulatory approval before final design plans and construction activities can begin. During the preconstruction and detailed engineering phase, the Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area of the recommended plan. Impacted landowners will be notified in writing, and will be offered fair market value for the land interest required for the project.
CD _9-18-2013_1_David Vitter	When, and in what manner, will I be notified that any portion of my land will be subject to condemnation?	The project recommendation is subject to project authorization, funding and regulatory approval before final design plans and construction activities can begin. During the preconstruction and detailed engineering phase, the Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area of the recommended plan. Impacted landowners will be notified in writing, and will be offered fair market value for the land interest required for the project.
CD _9-18-2013_1_David Vitter	What is the timeline on when construction may directly affect my property?	The final feasibility study report and NEPA document, and the proposed Report of the Chief of Engineers, have currently been released for State and Agency review, as required by the Flood Control Act of 1944 as amended (33 U.S.C. 701-1). After the final review period is over and once the Chief of Engineers signs the report signifying approval of the project recommendation, the report is forwarded to the chairpersons of the Senate Committee on Environment and Public Works, and the House of Representatives Committee on Transportation and Infrastructure. The project recommendation is still subject to project authorization, funding, and regulatory approval before construction can begin. The Corp will continue to keep the public informed of actions through notices in local newspapers, on the Corps website, and on social media sites. In addition interested parties can be added to a mailing list and receive notices on anything the Corps does in a parish.
CD _9-18-2013_1_David Vitter	How long may the project last on our site?	The Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area of the recommended plan. A detailed construction schedule will be developed in PED. The Corp will continue to keep the public informed of actions through notices in local newspapers, on the Corps website, and on social media sites. In addition interested parties can be added to a mailing list and receive notices on anything the Corps does in a parish.
CD _9-18-2013_1_David Vitter	How wide and tall is the wall going to be through my property?	T-walls will only be used in locations of pipeline crossing and drainage structures. The heights vary by levee reach. Details on the specific heights can be found in the engineering appendix.
CD _9-18-2013_1_David Vitter	Has an Environmental Impact Study been done on how the levee ill affect the wetlands and animals in our area and on my land?	The Draft Environmental Impact Statement (EIS) that was sent to the public for review described the direct, indirect and cumulative impacts to wetlands, wildlife, fisheries, and water quality, due to the implementation of the tentatively selected plan. A final EIS provides for detail examination of those impacts due to the recommended plan. These documents specially spells out direct and indirect impacts by the project over the entire study area.
CD _9-18-2013_1_David Vitter	How much materials, equipment, and crew will be placed at our site?	Temporary work areas will be mainly focused on the proposed levee ROW. Any additional temporary work area easements if needed would be developed during PED, but the Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
CD _9-18-2013_1_David Vitter	How much of my land will need to be cleared to make way for the levee or wall?	The project recommendation is subject to project authorization, funding and regulatory approval before final design plans and construction activities can begin. During the preconstruction and detailed engineering phase, the Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area of the recommended plan. Impacted landowners will be notified in writing, and will be offered fair market value for the land interest required for the project.
CD _9-18-2013_1_David Vitter	Will any of our Cypress trees be cut down or removed from my property?	The project recommendation is subject to project authorization, funding and regulatory approval before final design plans and construction activities can begin. During the preconstruction and detailed engineering phase, the Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area of the recommended plan. Impacted landowners will be notified in writing, and will be offered fair market value for the land interest required for the project.
CD _9-18-2013_1_David Vitter	Will a wall or levee be placed through our property?	The project recommendation is subject to project authorization, funding and regulatory approval before final design plans and construction activities can begin. During the preconstruction and detailed engineering phase, the Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area of the recommended plan. Impacted landowners will be notified in writing, and will be offered fair market value for the land interest required for the project.
CD _9-18-2013_1_David Vitter	How will the Corp get the materials to the work site?	Levee access areas will be mainly focused on the proposed levee ROW. Any additional accesses areas if needed would be developed during PED, but the Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area.
CD _9-18-2013_1_David Vitter	Will the Corp be using my land or water ways during construction .	Levee access areas will be mainly focused on the proposed levee ROW. Any additional accesses areas if needed would be developed during PED, but the Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area.
CD _9-18-2013_1_David Vitter	Will flood gates be used on all waterways that are being affected y the proposed protection?	The proposed design is included in the engineering appendix of the final report. Any loss of existing use of the waterways by stakeholders will evaluated during PED. The Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area.
CD _9-18-2013_1_David Vitter	Can the proposed project be pushed closer and along HWY 51 with access to Frenier rd?	The Corps in PED will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area of the recommended plan. Minor design changes may take place at that time.
CD _9-18-2013_1_David Vitter	In what manner may I communicate with the Corp of Engineers with regard to their plan and possible ways to minimize the potential damage to our business?	The Corp's Public Office can be contacted directly: (504) 862-2201 or email AskTheCorps@usace.army.mil The Corp will continue to keep the public informed of actions through notices in local newspapers, on the Corps website, and on social media sites. In addition interested parties can be added to a mailing list and receive notices on anything the Corps does in a parish.
CD _9-18-2013_1_David Vitter	In what manner will we be compensated if our buildings and grounds must be raised as a result of the project?	The Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area of the recommended plan. If there are any impacts, landowners will be notified in writing if any mitigation actions will needed to take place.
CD _9-18-2013_1_David Vitter	Will my business be able to operate on our site and have access to our waterways and surrounding waterways, as well as maintain its current frontage the highway, during the construction of the proposed levee or wall?	Any loss of existing use of the waterways by stakeholders will evaluated during PED. The Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area.
CD _9-18-2013_1_David Vitter	In what manner will we be compensated for any loss of business suiting from project?	Any loss of existing use of the waterways by stakeholders will evaluated during PED. The Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area.
CD _9-18-2013_1_David Vitter	In what manner will we be compensated for loss of land, Cypress Trees removed or cleared, and cost to rebuild the marsh and wetlands that are disturbed?	The project recommendation is subject to project authorization, funding and regulatory approval before final design plans and construction activities can begin. During the preconstruction and detailed engineering phase, the Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area of the recommended plan. Impacted landowners will be notified in writing, and will be offered fair market value for the land interest required for the project.
CD _9-18-2013_1_David Vitter	Will we be compensated for loss of business due to an inability to conduct tours directly caused by the hurricane protection?	Any loss of existing use of the waterways by stakeholders will evaluated during PED. The Corps will work to avoid, minimize and reduce impacts to landowners and existing infrastructure in the area. In the event, that property is acquired from you for construction of the project, compensation for such property will be made in accordance with Public Law 91-646. Prior to initiation of acquisition activities, the Corps of Engineers will conduct public meetings to generally explain the acquisition process. Subsequently, meetings will be held with impacted landowners to discuss individual situations.
FED _10-1-2013_1_NMFS	NMFS1: NMFS does not object to hurricane protection to reduce risk to life or property, or to the proposed levee alignment. However, we find the draft EIS lacks information necessary to demonstrate adverse wetland impacts would be fully offset through the implementation of an adequate mitigation plan. Specifically, adverse wetland impacts are not quantified by the Wetland Value Assessment methodology determined acceptable under USACE guidelines for Louisiana habitats. In addition, the mitigation plan included in Appendix A, Annex K, proposes conceptual mitigation ideas only which also have not been assessed or quantified to determine benefits. Lacking an assessment of impacts and benefits, it is unclear how the USACE can determine wetland impacts would be fully offset in compliance with the Clean Water Act. Lacking an adequate assessment of mitigation benefits, or a discussion which clearly identifies the potential for long term wetland impacts if mitigation is inadequate, it is unclear how the draft EIS fully complies with NEPA requirements. Finally, the proposed mitigation plan does not have sufficient information to demonstrate compliance with the 12 "items" required by mitigation regulations. This information is necessary for project planning purposes, including alternatives analysis, and equally important for public disclosure of the type and location of the mitigation	Potential project-induced impacts of the Recommended Plan to wetlands and other resources have been quantified by the Wetland Value Assessment (WVA) methodology during the Feasibility-Level Analysis phase. Findings from the WVA analysis were utilized to determine compensatory mitigation which would compensate for unavoidable project-induced impacts. A mitigation plan (Appendix A Annex K) has been developed in coordination with resource agencies. Mitigation benefits were also assessed utilizing WVA methodology. The mitigation plan will include the 12 “items” required to demonstrate compliance with 33 CFR 332.4(c) including: objectives, site protection instrument, baseline information, work plan, maintenance plan, performance standards, monitoring requirements, financial assurances, site selection factors, credit determination, long-term management plan and adaptive management plan. Findings from the above been utilized for the completion of the Clean Water Act Section 401 Water Quality Certification (Appendix A Annex A) and Section 404(b)(1) (Appendix A Annex A2), and the Coastal Zone Consistency Determination (Appendix A Annex B). All of are presented for public comment in this Final Report.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
FED _10-1-2013_1_NMFS	NMFS2: NMFS is concerned the source of more than 3 million cubic yards of borrow material for levee construction is not identified, and associated impacts discussed, in the draft EIS. Unless there is a commitment to not obtain borrow from wetlands or other sensitive habitats, NMFS believes failure to discuss or disclose what could be a significant environmental impact is a violation of NEPA. We encourage the USACE to use non-wetland borrow locations to the maximum extent practicable. If the USACE determines wetland impacts associated with borrow sources are unavoidable, a discussion and quantification of such wetland impacts (and mitigation costs) should be included in a supplemental draft EIS for this project	Borrow sources have been identified and associated impacts of removing and using the borrow have been addressed in the Final Report. WVAs were developed for the borrow sources and mitigation is included in the project. The USACE intends to obtain borrow from non-wetland or other sensitive habitats to the maximum extent practicable. Unavoidable impacts associated with borrow sources have been fully quantified, discussed and appropriate compensatory mitigation provided; all of which is discussed in this Final Report.
FED _10-1-2013_1_NMFS	NMFS3: While direct wetland impacts have been quantified for the TSP in terms of acreage, NMFS does not agree sufficient information has been provided to demonstrate indirect impacts to more than 8,000 acres of enclosed wetlands would not occur.	Due to the uncertainty of characterizing potential indirect impacts without having conducted a WVA analysis, indirect impacts were characterized as a range between 5 to 75 percent; in addition professional judgment and existing WVAs from restoration projects in the area in combination with data Coastal Restoration Monitoring Stations (CRMS) within the study area were used to determine a single estimate of approximately 15 % of potentially indirectly-impacted acreage. A WVA analysis was conducted during the feasibility-level analysis phase of this study and included in the final report. The WVA analysis predicts a 34% negative indirect impact to the enclosed wetlands rather than the 15% used in the draft report.
FED _10-1-2013_1_NMFS	NMFS4: The draft Adaptive Management and Monitoring Plan has not been finalized, but at present, only includes monitoring of mitigation plan success and corrective actions to be taken if such actions do not result in anticipated benefits. The draft Adaptive Management and Monitoring Plan does not include efforts to evaluate whether project implementation results in adverse impacts to enclosed wetlands. The final EIS should include an Adaptive Management and Monitoring Plan, developed in coordination with the natural resource agencies, which evaluates the impact of levee construction and water control structure operations on enclosed wetlands. NMFS recommends sufficient funds be included in the overall cost projection to sufficiently address adaptive management and monitoring needs for the enclosed wetlands and the mitigation areas.	The Adaptive Management and Monitoring Plan has been finalized in coordination with the natural resources agencies during the feasibility -level analysis phase and is included in the Final Report including detailed costs. Drainage canals have been incorporated into the levee design to maintain hydrologic connectivity between the wetlands on the protected side and non-protected side of the structure. Additionally, pumping stations will be designed to provide sufficient capacity to address any potential that project construction could interrupt pre-existing drainage patterns. Any unavoidable impacts to the enclosed wetlands will be compensated for through construction of various mitigation features within the basin. As described in the mitigation plan (see Appendix A , Annex K), USACE intends to monitor and adaptively manage all mitigation projects in accordance with the provisions of that plan. Any monitoring or adaptive management activities in the wetlands on the protected side of the levee would exceed the project purpose and would fall outside of the authorization.
FED _10-1-2013_1_NMFS	NMFS5: According to the draft EIS, under both intermediate and high sea level rise scenarios, in 50 years all structures providing drainage between enclosed wetlands and exterior waters would be closed the vast majority of the time. However, no discussion is provided to identify how water levels in enclosed wetlands would be managed. The final EIS should identify and discuss this issue.	Hydrologic connectivity would be maintained to the extent practicable through water control structures except during closure for hurricanes or tropical storms. When the system is closed, pumps would operate on average for 1.7 storms per year, which equates to a closure of structures on average 8.5 days per year. This expected rate of closure would be the same under a changing sea level rise conditions, due to the fact that the trigger for structure closures would be under tropical storm events and the elevation trigger would be adjusted as sea level rises. The recommendation only addresses hurricane and storm damages and the system would not close more often due to higher day-to-day sea level rise impacts. Any operational changes outside of the original project purpose; the reduction of damages caused by wind-generated and tide-generated waves and currents, would be considered a separate project purpose and authorization, and would require a new NEPA documentation and/or a permit approval for this operation change.
FED _10-1-2013_1_NMFS	NMFS6: Chapter 2, Section 2.4.5 Essential Fish Habitat, Page 2-24. NMFS agrees project implementation would not adversely impact essential fish habitat (EFH). As such, an EFH assessment is unnecessary. NMFS recommends this section be deleted from the final EIS. Likewise, NMFS recommends Section 4.3.5 also be removed from the final EIS.	Certain resources are considered significant and should always be discussed in a NEPA document where that resource may occur. It is our opinion that in coastal Louisiana EFH is one of those resources. No change to chapter 2 has occurred. Additional information on impacts to EFH has been included in chapter 5 specifically for impacts from some of the mitigation sites.
FED _10-1-2013_1_NMFS	NMFS7: Chapter4, Section 4.3.2 Vegetation Resources, Page 4-12. Wording in the second paragraph indicates Alternative C would directly impact 719 acres of wetlands, while Table 4-2 indicates 775 acres of wetlands would be impacted. The correct numbers should be provided in the final EIS.	Table 5-1 includes the correct direct, indirect, and total acres impacted (both the draft and final feasibility acres) for swamp and BLH under Alternative C.
FED _10-24-2013_1_EPA	Comment EPA1: We appreciate the Corps' efforts to streamline the planning and review process, such as the Corps' SMART planning process, however EPA believes there is important information lacking in the Draft EIS. Using this process, the Corps has integrated the environmental analysis in a shortened draft Feasibility Report and EIS. We believe the Corps can use this approach to provide concise, accessible NEPA documents that succinctly disclose the potentially significant impacts of project alternatives. EISs that are more readable can both improve the decision making process and help inform and engage the affected public. With regard to this Draft EIS, our specific concerns focus on the nature and extent of the direct, indirect and cumulative adverse environmental impacts associated with the TSP, Alternative C, and the lack of information in the Draft EIS assessing those effects. The Draft EIS also does not effectively assess the potential environmental impacts of alternative levee alignments. Such information is essential for making an informed decision regarding the environmental acceptability of the alternatives under consideration. Using the SMART planning approach, the Corps is selecting a preferred alternative prior to conducting sufficient environmental impact assessment on other reasonable options.	Concur, there is a lack of some detailed information in the draft EIS regarding the nature and extent of the potential direct, indirect and cumulative impacts pending selection of the Recommended Plan upon which detailed hydrological modeling and WVA habitat analysis would be conducted. However, do not concur that the USACE has selected a preferred alternative prior to conducting sufficient environmental impact analysis on reasonable options. The use of the existing CRMS monitoring site vegetation information within the project area, as well as the professional knowledge and understanding of the project area by team members was sufficient to develop and screen amongst the measures and alternatives developed for this legacy project. Please see section 3.9.3 for an additional screening based feasibility level WVA analysis. This analysis verified or choice of the TSP.
FED _10-24-2013_1_EPA	Comment EPA2: However, as you move toward a final decision for this project, EPA believes it is essential that the planning effort consider more fully the means to avoid, minimize, and mitigate environmental impacts, particularly with respect to coastal wetlands.	Response: Concur. By conducting a WVA habitat analysis and utilizing more detailed hydrologic modeling results, a detailed compensatory mitigation plan for the proposed action was developed and is included in this final report.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
FED _10-24-2013_1_EPA	Comment EPA3: As currently proposed, the proposed levee would enclose over 16 square miles of wetlands, and the Draft EIS provides limited information on how the enclosure will affect the functions and values of these wetlands. While the Draft EIS indicates that the levee would be constructed to maintain hydrologic connectivity between the enclosed wetlands and the surrounding swamps, and Lakes Maurepas and Pontchartrain, detailed information on this critical project feature is not provided. Instead, the Draft EIS only provides a general statement that hydrologic connectivity would be maintained by constructing culverts with sluice gates in the new levee to join with existing culverts under Interstate 10, with no supporting detailed information on the locations and design of these new culverts.	Response: Concur. More detailed hydrologic information regarding project features, including locations and design of culverts to maintain hydrologic connectivity, is provided in this final report. This information can be found in sec. 5.1 as part of the Levee System, and on figure 5-2.
FED _10-24-2013_1_EPA	Comment EPA4: The Draft EIS also reports that preliminary modeling shows only "minimal changes to flows" (p. 4-14), with no additional details on how that modeling was conducted or the results (although the Draft EIS does present the results for modeling at one location, showing a 25% reduction in flows (p. 4-1)). EPA believes it is essential that the Final EIS more fully describe and demonstrate how hydrologic connectivity will be maintained.	Response: Concur. The Final Report provides more detailed information regarding hydrologic connectivity, structure operations and how hydrologic connectivity of the Recommended Plan will be maintained. This information can be found in sec. 4.1.1 Hydrologic Flows.
FED _10-24-2013_1_EPA	Comment EPA5: Moreover, the Final EIS should include an assessment of the potential for relative sea level rise to result in an increase in the closure frequency of the gates and culverts. Other Corps levee studies in Louisiana have shown that such increased frequency of closure can convert an open levee system into one that is increasingly closed, resulting in potentially significant adverse environmental impacts.	Hydrologic connectivity would be maintained to the extent practicable through water control structures except during closure for hurricanes or tropical storms. When the system is closed, pumps would operate on average for 1.7 storms per year, which equates to a closure of structures on average 8.5 days per year. This expected rate of closure would be the same under a changing sea level rise conditions, due to the fact that the trigger for structure closures would be under tropical storm events and the elevation trigger would be adjusted as sea level rises. The recommendation only addresses hurricane and storm damages and the system would not close more often due to higher day-to-day sea level rise impacts. Any operational changes outside of the original project purpose; the reduction of damages caused by wind-generated and tide-generated waves and currents, would be considered a separate project purpose and authorization, and would require a new NEPA documentation and/or a permit approval for this operation change.
FED _10-24-2013_1_EPA	Comment EPA6: The EPA is also concerned that the Draft EIS does not consider measures to restrict development on wetlands enclosed behind the levees. The Feasibility Report indicates that Alternative C was tentatively selected, in part because these enclosed wetlands would reduce the residual flood risks due to floodwater overtopping the levee. This would allow floodwaters to fill these wetlands first before inundating populated areas. Considering this concern:, EPA recommends the purchase of non-development easements and/or the implementation of local flood zoning ordinances to limit development in these areas.	Response: Do not concur. Existing local building codes would still required developments to build above the 100 yr stage for rainfall impacts, and with an open levee system, the stage is still going to increase over time because of RSLR impacts. Existing local building codes would require significant amounts of fill material for new developments. These areas would still be in jurisdictional wetland and would required compensatory mitigation for impacting these areas. These two factors and the existing available upland areas for development; at a much lower cost, would limit the development in these areas. Additional information can be found in section 6.18 of the main report
FED _10-24-2013_1_EPA	Comment EPA7: Moreover, the Draft EIS does not provide information regarding alternative locations for the source of the levee-building material should the primary source not be sufficient. EPA recommends additional information regarding alternative borrow sites, as well as the development of site selection criteria to ensure that sites with wetlands and/or bottomland hardwoods are not used.	Response: Concur. Any additional borrow will come from pre-approved borrow sites in the Bonnet Carre spillway. These site have been reviewed for all applicable laws and includes avoidance of wetland and BLH. This information is included in section 5.1 of this final document.
FED _10-24-2013_1_EPA	*Comment* EPA8: Finally, EPA is concerned that the Draft EIS provides limited information regarding potential mitigation measures to compensate for wetland losses, and does not provide information to demonstrate compliance with the Clean Water Act Section 404(b)(1) Guidelines (especially the Guidelines' requirements that proposed discharges of dredged or fill material must be the least environmentally damaging practicable alternative).	Response: Concur. The Final Report includes a detailed Mitigation and Adaptive Management and Monitoring Plan (Appendix A Annex K) for unavoidable project-induced impacts to wetlands. The Final Report will also include a detailed Clean Water Act Section 401 Water Quality Certification (Appendix A Annex A) and Section 404(b)(1) (Appendix A Annex A2), and the Coastal Zone Consistency Determination (Appendix A Annex B) in relationship to construction and operation of the Recommended Plan.
FED _10-24-2013_1_EPA	Comment EPA9: Clean Water Action Section 404(b)(1) Guidelines--The Corps has identified Alternative C as the tentatively selected plan (TSP) prior to determining whether it complies with the Clean Water Act Section 404(b)(1) Guidelines (Guidelines). The Guidelines require that discharges of dredged or fill material be the least environmentally damaging practicable alternative. However, based on information in the Draft EIS, Alternative A appears to be significantly less environmentally damaging than Alternative C. Alternative A would result in direct impacts, i.e., filling to create the new levee, to approximately 376.55 acres of wetlands, whereas Alternative C would have direct impacts to 775.13 acres of wetlands. Alternative C also has a substantially greater potential for indirect wetland impacts. Alternative A would enclose approximately 5 square miles of wetlands, whereas Alternative C would enclose approximately 16 square miles of wetlands. Alternative A provides annual benefits equivalent to Alternative C and protects the same number of properties, the same communities, and the same length of highway. According to Table 3-3, the estimated implementation costs of these alternatives are roughly equal. Alternative A would cost approximately $887.6 million, whereas Alternative C would cost $880.9 million. At least in terms of cost, Alternative A would appear to be practicable. EPA recommends the Final EIS provide an evaluation of how the TSP would comply with the Guidelines' requirements.	Response: Concur, the Final Report provides an additional screening (section 3.9.3) based feasibility level WVA analysis. The conclusion of that analysis: Alternative D has the greatest habitat impacts (approximately 2,080 AAHUs more than Alternative C), highest mitigation costs, the lowest BC ration, and lowest net benefits. Alternatives A and C are comparable in total impacts, with Alternative A having a total impact of approximately 151 AAHUs less. Alternative C has less direct impact, while Alternative A has fewer indirect impacts. Both Alternative A and C are considered environmentally acceptable alternatives, and provide benefits to the same number of structures. Alternative C has the lowest total cost (including mitigation), the highest BC ratio, and highest net benefits. Alternative C would have less residual risk and increased safety, consistent with the 2006 USACE Interagency Performance Evaluation Task Force (IPET) report on the performance of the Performance Evaluation of the New Orleans and Southeast Louisiana Hurricane Protection System; and would minimize oil and gas pipeline crossings (36 crossings for Alternative C versus 70 crossings for Alternative A). This analysis show the Recommended Plan would comply with the Clean Water Action Section 404(b)(1) Guidelines as a least environmentally damaging practicable alternative.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
FED _10-24-2013_1_EPA	Comment EPA10: Residual Risk and Enclosed Wetlands--The decision to view the enclosure of wetlands as an important part of a risk reduction project could lead to further loss and degradation of coastal wetlands.	Response: Do not concur. Existing local building codes would still required developments to build above the 100 yr stage for rainfall impacts, and with an open levee system, the stage is still going to increase over time because of RSLR impacts. Existing local building codes would require significant amounts of fill material for new developments. These areas would still be in jurisdictional wetland and would required compensatory mitigation for impacting these areas. These two factors and the existing available upland areas for development; at a much lower cost, would limit the development in these areas. Additional information can be found in section 6.18 of the main report
FED _10-24-2013_1_EPA	Comment EPA11: Based on our review of the Draft EIS, it is unclear to what extent the residual risks associated with each alternative were analyzed and quantified. EPA recommends clarifying this issue, including examining ways to further reduce residual risk associated with Alternative A (e.g., by elevating properties inside the levee system and/or increasing internal pumping capacity), calculating how much undeveloped land would need to be included within the levee system in order to adequately reduce residual risk, and determining the amount of wetland area that would adequately mitigate residual risk and providing technical evidence to support the findings.	Further attempts reduce residual risk associated with Alternative A would only further reduce the NED cost to benefit ratio with limiting returns. This is not a reasonable and implementable alternative. Including items such as elevating properties inside the levee system and/or increasing internal pumping capacity or creating retention ponds would have significant cost and would not provide any significant NED benefits due to the fact that the potential for exceedance events occur above the 100 yr frequency. The residual risk reduction afforded by Alignment C is not a project feature. It is only an incidental benefit for avoiding the pipelines.
FED _10-24-2013_1_EPA	Comment EPA12: Wetlands enclosed within a levee system are at increased risk of being converted for development purposes. Such induced development would add to cumulative wetland losses, reduce flood storage capacity, and increase properties at risk. However, the Draft EIS does not evaluate the potential for induced development in enclosed wetlands. Moreover, the Draft EIS does not describe how enclosed wetlands would be protected from future development. If enclosed wetlands are determined to be a necessary residual risk reduction feature in order to maintain the appropriate level of public safety, EPA recommends these wetlands be permanently protected by acquisition or conservation servitude.	Response: Do not concur. The USACE does not consider that wetlands enclosed by the proposed action would necessarily result in induced development. The USACE also does not concur that any enclosed wetlands should be permanently protected by acquisition or a by conservation servitude. A. Existing local building codes would still required developments to build above the 100 yr stage for rainfall impacts, and with an open levee system, the stage is still going to increase over time because of RSLR impacts. Existing local building codes would require significant amounts of fill material for new developments. These areas would still be in jurisdictional wetland and would required compensatory mitigation for impacting these areas. These two factors and the existing available upland areas for development; at a much lower cost, would limit the development in these areas. Additional information can be found in section 6.18 of the main report
FED _10-24-2013_1_EPA	Comment EPA13: Estimating Mitigation Costs-- By making a TSP selection using a limited environmental assessment, the Corps may have excluded relevant mitigation costs	Response: Concur. The TSP reported in the Draft Report was determined using primarily existing information sufficient to develop reasonable alternatives and determining a tentatively selected plan. This included an estimation of the cost for mitigation based existing data and professional judgment. The Final Report includes a detailed environmental assessment for the recommended plan as well as detailed Mitigation Plan.
FED _10-24-2013_1_EPA	EPA14: We recommend that the Final EIS estimate the number of environmental structures needed for each alternative in order to more accurately calculate and compare benefit-to-cost ratios.	Chapter 5 of the Final Report includes the number of environmental structures needed for the Recommended Plan. The location and number of environmental structures for Alternative A and C can be found on figure 3-1.
FED _10-24-2013_1_EPA	EPA15: The Draft EIS also states that "[a]t this stage, mitigation costs for indirect impacts remain uncertain due to limited hydrologic information and lack of a full wetland value assessment". (Section 3.6, page 3-1 0) We recommend the Corps consider whether limitations in the assessment of potential wetland mitigation costs could be significant relative to the benefit-to cost ratios for each alternative.	The Final Report provides an additional screening (section 3.9.3) based on the feasibility level WVA analysis.
FED _10-24-2013_1_EPA	EPA16: The selection of Alternative C as the TSP is in part based on the Corps finding that it maximizes net project benefits. According to the Draft EIS, Alternative A would provide a 1.48 benefit-to-cost ratio, while Alternative C would provide a 1.63 benefit-to-cost ratio. Given information limitations pertaining to environmental structures, adverse impacts, mitigation, and other factors, we recommend that the Corps re-evaluate the benefit-to-cost ratio.	The benefit to cost ratio was refined for the Recommended Plan and presented in the Final Report (chapter 5 and the Appendix D - Economic). The detailed re-assessment of the benefit-to-cost ratios for other alternatives in the final alternative array would not provide any additional information sufficient to change the selection of the TSP, because any uncounted costs would be equal to both Alternatives C and A, therefore their relative ranking on the basis of net benefits would remain unchanged.
FED _10-24-2013_1_EPA	EPA17: As was done for the Greater New Orleans Hurricane and Storm Damage Risk Reduction System, we would strongly encourage the Corps to use non-wetland borrow locations to the maximum extent practicable. Should the Corps determine that wetland impacts associated with borrow sources are unavoidable, an estimate of such potential wetland impacts (and mitigation costs) should be included in the Final EIS for this project. Other Corps levee NEPA documents in coastal Louisiana have identified specific locations for borrow material including the programmatic EIS for Morganza and the numerous reports prepared for the expedited NEPA process on the post-Katrina New Orleans levee upgrades. Regardless of the language in the appendix, the Draft EIS clearly states that the Corps retains the option to use undisclosed locations with undisclosed impacts. Borrow site wetland impacts can be significant. This is a major deficiency in the impact analysis for WSLP.	Borrow sources have been identified and associated impacts of removing and using the borrow have been addressed in the Final Report. WVA were developed for the borrow sources and mitigation is included in the project. The USACE intends not to obtain borrow from non-wetland or other sensitive habitats to the maximum extent practicable. Unavoidable impacts associated with borrow sources have been fully quantified, discussed and appropriate compensatory mitigation provided; all of which is discussed in this Final Report.Any additional borrow will come from pre-approved borrow sites in the Bonnet Carre spillway. These site have been reviewed for all applicable laws and includes avoidance of wetland and BLH. This information is included in section 5.1 of this final document.Borrow sources have been identified and associated impacts of removing and using the borrow have been addressed in the Final Report. WVA were developed for the borrow sources and mitigation is included in the project. The USACE intends not to obtain borrow from non-wetland or other sensitive habitats to the maximum extent practicable. Unavoidable impacts associated with borrow sources have been fully quantified, discussed and appropriate compensatory mitigation provided; all of which is discussed in this Final Report.Any additional borrow will come from pre-approved borrow sites in the Bonnet Carre spillway. These site have been reviewed for all applicable laws and includes avoidance of wetland and BLH. This information is included in section 5.1 of this final document.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
FED _10-24-2013_1_EPA	EPA18: The Corps has correctly acknowledged the potential for indirect impacts to enclosed wetlands and has attempted to quantify these impacts in the Draft EIS. However, the effort to do so with limited information highlights the remaining uncertainty regarding this critical component of the WSLP study. For example, it is unclear how the Corps estimated an indirect habitat reduction of 15% for enclosed wetlands.	The uncertainty related to indirect habitat reductions resulted from the use of preliminary hydrologic modeling and use of existing CRMS monitoring stations data, instead of the typical Wetland Value Assessment data. Based upon this uncertainty, a range from 5 to 75 percent of potential indirect impacts was developed to address this uncertainty. The use of 15 percent for characterizing indirect impacts was based upon two primary factors: 1) our understanding of the area's ecosystem dynamics developed during intensive investigations on ecosystem dynamics for restoration projects such as the LCA Small Diversion at Convent/Blind River, LCA Amite River Diversion Canal Modification and the CWPPRA Maurepas Diversion; and 2) preliminary engineering designs and the expectation that the engineering design would maximize inclusion of hydrologic interchange features, to the extent practicable, within the levee system. The Final Report provides an additional screening (section 3.9.3) based feasibility level WVA analysis.
FED _10-24-2013_1_EPA	EPA19: According to the Draft EIS, hydrologic modeling indicates that the proposed levee could cause a 25% reduction in interchange between flood and protected-side wetlands in at least some portion of the enclosed area. (Section 4.1.1, Page 4-1) It is unclear how this estimate was determined without first specifying the number of how many environmental structures would be constructed. It is also not clear how this modeling result relates to the assumed 15% habitat reduction discussed above. Nevertheless, a 25% reduction in hydrologic exchange would have substantial adverse impacts to the enclosed wetlands, and is not consistent with statements that hydrologic connectivity would generally be maintained between enclosed wetlands and the surrounding swamp. We would also note that this estimate of reduced exchange does not include potential future increases in environmental structure closure due to the combined effects of sea level rise and subsidence	As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages. This information can be found in sec. 4.1.1 Hydrologic Flows.
FED _10-24-2013_1_EPA	EPA20: The assessment of potential indirect wetland impacts does not include an analysis of potential increases in the frequency of environmental structure closures due to relative sea level rise (RSLR) over the life of the project. The Corps has determined that the environmental structures would be closed approximately 8.5 days per year and would otherwise remain open to minimize hydrologic disruption. These closures would occur when water levels outside the levee system meet a certain elevation (or risk) threshold. As has been noted in other Corps levee studies, RSLR can lead to a significant increase in the number of days that such a threshold is met and the environmental structures are closed. Structures originally designed to maintain hydrologic connectivity between enclosed and flood-side wetlands would be increasingly closed, further impounding and isolating interior wetlands	The recommendation only addresses hurricane and storm damages and the system would not close more often due to higher day-to-day sea level rise impacts. Any operational changes outside of the original project purpose; the reduction of damages caused by wind-generated and tide-generated waves and currents, would be considered a separate project purpose and authorization, and would require a new NEPA documentation and/or a permit approval for this operation change.
FED _10-24-2013_1_EPA	EPA21: In this regard, there are similarities between this project and the Corps' Morganza to the Gulf levee system. Both would enclose large wetland areas and include environmental structures intended to reduce hydrologic disruption. In response to comments by EPA and others, the Revised Programmatic EIS for the Morganza to the Gulf system includes the finding that under certain RSLR scenarios, increased closure frequency could have significant adverse impacts to wetlands, fisheries, and water quality. Despite acknowledging these environmental risks in the Morganza to the Gulf study, the Draft EIS for the WSLP study does not include a similar analysis.	Hydrologic connectivity would be maintained to the extent practicable through water control structures except during closure for hurricanes or tropical storms. When the system is closed, pumps would operate on average for 1.7 storms per year, which equates to a closure of structures on average 8.5 days per year. This expected rate of closure would be the same under a changing sea level rise conditions, due to the fact that the trigger for structure closures would be under tropical storm events and the elevation trigger would be adjusted as sea level rises. The recommendation only addresses hurricane and storm damages and the system would not close more often due to higher day-to-day sea level rise impacts. Any operational changes outside of the original project purpose; the reduction of damages caused by wind-generated and tide-generated waves and currents, would be considered a separate project purpose and authorization, and would require a new NEPA documentation and/or a permit approval for this operation change.
FED _10-24-2013_1_EPA	EPA22: According to the Draft EIS, the data used by the Corps to assess the wetland quality in impacted areas is derived from two monitoring stations (one of which did not provide complete information relative to salinity and/or water levels). We believe this limited data is not sufficient to evaluate potential impacts, especially given the relatively large area of wetlands that would be enclosed, the complexity of assessing indirect wetland impacts, and the importance of minimizing wetland losses. In addition, the tool used for this assessment is based on herbaceous vegetation whereas the vast majority of the potentially enclosed wetlands are forested. The Draft Feasibility Report and EIS acknowledges that this approach is "not ideal", and commits to conducting a full feasibility-level habitat analysis at a later point. (Section 4.3.2, Page 4-14).	The use of the CRMS monitoring stations, as well as previous WVAs from the LCA Small Diversion at Convent/Blind River as well as the professional judgment and experiences of team members who participated in this study; in addition to WVAs from the EPA-sponsored CWPPRA Project Maruepas Diversion project is consistent with the SMART planning process of using existing information sufficient to enable a comparison of the alternatives within the final alternative array and determine a tentatively selected plan. Potential project-induced impacts of the Recommended Plan to wetlands and other resources have been quantified by the Wetland Value Assessment (WVA) methodology during the Feasibility-Level Analysis phase. Findings from the WVA analysis were utilized to determine compensatory mitigation which would compensate for unavoidable project-induced impacts. A mitigation plan (Appendix A Annex K) has been developed in coordination with resource agencies. Mitigation benefits were also assessed utilizing WVA methodology. The mitigation plan will include the 12 "items" required to demonstrate compliance with 33 CFR 332.4(c) including: objectives, site protection instrument, baseline information, work plan, maintenance plan, performance standards, monitoring requirements, financial assurances, site selection factors, credit determination, long-term management plan and adaptive management plan. Findings from the above been utilized for the completion of the Clean Water Act Section 401 Water Quality Certification (Appendix A Annex A) and Section 404(b)(1) (Appendix A Annex A2), and the Coastal Zone Consistency Determination (Appendix A Annex B). All of are presented for public comment in this Final Report.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
FED _10-24-2013_1_EPA	EPA23: The Draft EIS states that the "project would provide for the protection of protected side wetlands, potentially extending their lifespan and their water quality functions" (Section 4.1.3, Page 4-4). No data is provided to support this assertion, which is contrary to statements elsewhere in the document regarding potential adverse impacts to enclosed wetlands. The Draft EIS further states that closure of the levee system during storms "could provide some reduction of the potential ecological stresses associated with saltwater intrusion..." While we fully recognize that portions of the Maurepas Swamp have been stressed by salinity, it is unclear, based on the limited available data, whether this is the case for the portion of the swamp that would be enclosed by the proposed levee. We recommend that the Final EIS provide additional data and analysis to support this conclusion that the proposed levee could benefit enclosed wetlands.	The following text was deleted from Section 4.1 of the main report "The project could provide for some level of protection of protected side wetlands from salinity, thereby potentially extending their lifespan and their water quality functions" No environmental benefits for enclosing wetland have been claimed for this project.
FED _10-24-2013_1_EPA	EPA24: We recommend that the Final EIS clearly describe how the proposed WSLP levee would be consistent with the Corps' efforts to undo hydrologic disruption and impoundment elsewhere in the swamp.	A flood side ditch and a protected side canal would parallel the entire levee length. The canals would be used to maintain the existing connection between swamps inside and the swamps outside the levee system.
FED _10-24-2013_1_EPA	EPA25: Air Quality Impacts--Chapter 2 of the Draft EIS states that air quality for the three parish area (St. Charles, St. John the Baptist, and St. James, Louisiana) is in attainment of all National Ambient Air Quality Standards and a general conformity determination is not required, and therefore air quality will not be further discussed. EPA believes it is especially important that information regarding the potential air quality impacts during the any construction phase of the project and related mitigation measures are fully discussed (i.e., mitigation measures for Particulate Matter (PM)/dust control, air quality impacts of construction vehicles etc.) As presented on Page 3-7 of Chapter 3, Alternative A construction would require roughly.	Coordination with Louisiana Department of Environmental Quality Mr. Yasoob Zia, air quality for the three parish project area (St. Charles, St. John the Baptist, and St. James, Louisiana) is in attainment of all National Ambient Air Quality Standards and a general conformity determination is not required. Additional air quality information is provided in Chapter 5 for the mitigation sites that are in Parishes that are not in attainment.
FED _10-24-2013_1_EPA	EPA26: EPA also recommends the use of best management practices (BMP)s for PM10 and fugitive dust control (e.g., gravel roads, soil wetting practices, limiting access, traffic and speed reduction). To further reduce potential air quality impacts, the responsible agencies should also include a Construction Emissions Mitigation Plan (Plan) and adopt this Plan in the Record of Decision (ROD). The Final EIS should discuss specific actions including dust ordinances on the parish level, educational outreach tools, and tools to minimize the residents' exposure to PM10 for St. Charles, St. John the Baptist and St. James Parishes, as applicable. In addition to measures included in the Draft EIS and applicable local, state, or federal requirements, EPA recommends that mitigation measures (as applicable) be included in the Plan in order to reduce impacts associated with emissions of PM, and other pollutants from any planned structural and non structural activities, and possible future modifications to the roadway system. Specific information on mobile and stationary source control can be found at: http://www.epa.gov/otan/nonroad-diesel.htm; http://www.epa.gov/ttncatc1/dir1/fmepmtech.pdf	BMPs to avoid, minimize and reduce potential impacts related to particulate matter as well as fugitive dust control will be utilized during construction in parishes that are not in attainment.
FED _10-24-2013_1_EPA	EPA27: The EPA recommends the Final EIS include an inventory of GHG emissions associated with construction of the proposed project.	Reviews to date have found that GHG emissions from the recommended action will have small potential effects compared to the no action plan. The main emissions of concern would be from the inclusion pump stations with the recommended plan. The pump stations are expected to only operate 8.5 days per year for storm events and are not expected to produce any environmental effects related to GHG that would trigger or require a detailed discussion in the EIS.
FED _10-24-2013_1_EPA	EPA28: CLIMATE CHANGE--Given the emphasis by the President in appropriately addressing climate change, including rebuilding infrastructure, EPA recognizes the importance of the Draft EIS's consideration of how climate change could potentially influence the proposed project in terms of its effectiveness over time in reducing flood risk. By including and considering additional analysis regarding potential indirect impacts, the Corps can help ensure the region is rebuilt in a way that makes it more resilient and better able to withstand future storms and other risks posed by a changing climate. EPA looks forward to continuing to work with the Corps of Engineers and incorporate the President's climate change adaptation goals, strengthening the resiliency of our coastal communities, and addressing the nation's pressing infrastructure needs.	Comment noted

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
FED _10-24-2013_1_EPA	EPA29: ENVIRONMENTAL JUSTICE ISSUES-- Section 2.3.8 of the Draft EIS is not clear whether locations outside the protection of the levee system would experience induced flooding and whether any of these locations would be identified as having potential environmental justice concerns. Additionally, the Draft EIS is also not clear in specifying what the additional outreach methods include and whether they have occurred (p. 2-15). Information on percent minority and percent low income populations was absent from Table 2-12 for Garyville, Louisiana.	As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages. The additional outreach methods used include canvassing of neighborhoods, as well as public meetings that were not always specific to environmental justice, yet provided ample opportunity for the public to comment and be involved in the planning process. Appropriate public involvement strategies will continue to be used as the project progresses.
FED _10-24-2013_1_EPA	EPA30: According to Section 6.20, one public meeting was held specific to environmental justice issues on May 21,2013 in Lutcher. The Draft EIS does not provide information as to what issues were identified at this meeting or who attended. The Draft EIS also does not indicate whether there were outreach efforts in Reserve, Louisiana which was identified in the Draft EIS as a potential environmental justice concern in Section 2.3.8.	Many of the concerns of the public were not environmental justice specific, but were more general as to what could be done about the rain induced flooding issues the communities currently experience; as well as how the proposed project would impact their homes and businesses. Additional public meeting information can be found in the Environmental Appendix, while not specifically identified as environmental justice, most comments addressed similar issues and concerns with flooding. Outreach efforts in Reserve included sending informational flyers being to residents detailing meeting locations and where they could get more information about the study.
FED _10-24-2013_1_EPA	EPA31: EPA recommends that the Final EIS 1) clarify the information for Garyville in Table -12, 2), clarify outreach methods listed in 2.3.8, particularly for Reserve, Louisiana, and 3) describe the issues and attendees at the May 21, 2013 public meeting. EPA also requests that the Corps clarify whether there are locations outside the protection of the levees that would experience induced flooding because of their construction and whether these locations have potential environmental justice concerns	Information has been updated for Garyville in the table. See comment to EPA30 on outreach efforts in Reserve, LA and issues posed.
FED _10-24-2013_1_EPA	EPA32: ENVIRONMENTAL JUSTICE REFERENCE COMMUNITIES-- The reference communities used in the analysis are comprised of extremely high percentages (61% for St. John Parish) of minority populations (Tables 2-10, 11, and 12). This appears to artificially dilute the representation of minority populations. Furthermore, the reference communities are not large enough to provide an accurate reference. For example, in St. John Parish, almost the entire reference community (total pop of 45,824) is comprised of the towns being analyzed (total pop of 42,449). They are essentially comparing the towns to themselves, not to a reference community. We recommend choosing alternative reference communities for inclusion in the Final EIS.	To avoid diluting the represented populations in the study area, the team conducted neighborhood canvasses as information flyers were handed to residents. It was determined that it was appropriate to compare the communities using census tracts and block groups and comparing them to parish populations for the east bank of the Mississippi River in the project vicinity. These outreach efforts took place in April and May of 2013, with the team observing that much of the area was not as densely population as expected. While identified as predominately minority, the majority of homes and residents observed were of a mixed population. Canvassing also allowed the team to count the number of homes and businesses (estimated at 33) that would be impacted by the project at different flood years (50, 100, and 200) and compare it to other areas with levees (i.e. Reserve). The number of homes that would be impacted in that time frame was minimal. Per discussions with EPA on February 20, 2014, the EPA panel agreed that this methodology was appropriate and recommended that additional methods be used when comparing majority minority populations such as the meaningfully greater analysis on future studies. The Corps concurred with the recommendation.
FED _10-24-2013_1_EPA	EPA33: ENVIRONMENTAL JUSTICE ANALYSIS METHODOLOGIES--Section 2.3.8 of the Draft EIS uses the 50% analysis for minority population identification, but not the meaningfully greater analysis. CEQ guidance explains that minority populations should be identified where either the 50% or meaningfully greater analyses are met, not 'either or' EPA recommends the Final EIS provide an explanation for the use of a 20% greater threshold for the identification of low-income populations and also what constitutes 'low income', e.g. individuals below Census poverty threshold, etc.	See above comment to EPA32 for use of meaningfully greater analysis and justification for using 50% percent analysis in a population area not as densely populated as expected. The 20% poverty threshold was used as recommended by the Department of Health and Human Services and was appropriate for this study. The EPA panel agreed in a meeting on February 20, 2014 that this was appropriate.
FED _10-24-2013_1_EPA	EPA34: The fact that the majority of the study area is comprised of racial or ethnic minorities should not negate the existence of disproportionate impacts, as the Draft EIS appears to conclude. (Section 2.3.8) A majority minority population study area may indicate that impacts are disproportionately falling on minority populations. Please clarify in the Final EIS.	Please see comment to EPA32-33. Further clarification is discussed in Section 2.3.8.
FED _10-24-2013_1_EPA	EPA35: The Environmental Justice analysis of impacts from the various alternatives is limited. Analysis of Alternative C states that incremental direct and indirect impacts would result in cumulative impacts to environmental justice populations, but does not describe what these impacts might be or analyze any mitigation measures to address these impacts. Also, the existing discussion of direct and indirect impacts is limited (Section 4.2.8). Please clarify in the Final EIS	As the project plans have changed, the cumulative impacts have been revised. Many of the direct and indirect impacts to the communities are discussed in the overall Economics section with the Environmental Justice sections focused primarily on those impacts that could be perceived as disproportionate when compared to other areas that did receive levee protection. Corps recommendation that the full economic and environmental justice sections be reviewed together for a full context of study impacts to residents.
FED _10-24-2013_1_EPA	EPA36: Section 4.2.8 of the Draft EIS states, that for Alternative C, properties in environmental justice communities eligible for acquisition may contribute to impacts on community cohesion due to the removal of a portion of the population. The Draft EIS then states that this population removal could potentially cause the collapse of the entire community. No further explanation or details are provided in the EIS regarding this issue. If these impacts do not similarly apply to the affected general population, then it appears they could be disproportionately high and potentially adverse. The EPA recommends further discussing this potential and, if necessary, considering appropriate mitigation measures in the Final EIS.	Acquisition of property is addressed in Appendix C- Real Estate section of the final report. The EJ analysis did not show specific disproportionate or adverse impacts to minority and/or low-income residents due to property acquisition as all residents, regardless of race or income would receive equal consideration if acquisition is necessary. Additionally, as participation in any acquisition program is strictly voluntary, quantification of impacts cannot be adequately assessed or predicted.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
FED _10-24-2013_1_EPA	EPA37: ENVIRONMENTAL JUSTICE MITIGATION MEASURES--Mitigation measures for impacts to environmental justice populations are not discussed. Section 2.3.8 of the Draft EIS identifies two communities that qualify as environmental justice communities; Lutcher and Reserve. The Draft EIS proposes further outreach efforts to these communities. While further outreach is appropriate, it is not sufficiently discussed. EPA recommends the Final EIS identify appropriate mitigation measures for these potential impacts.	Public involvement efforts are ongoing and will continue through the study process. We anticipate additional public meetings within the identified communities once they have reviewed the final report to address questions. As of May 2014, there have been no specific EJ concerns expressed by the resident's additional findings from outreach efforts and analysis.
FED _10-24-2013_1_EPA	EPA38: TRIBAL RESOURCES-- EPA recommends that complete descriptions of government to government and NHPA consultation activities be incorporated in the Final EIS, including correspondence to and from Tribal governments and other consultation-related documents. These documents would demonstrate fulfillment of Tribal consultation duties by the Corps and show the level of Tribal government engagement in both processes.	Description of government to government and NHPA consultation activities, including correspondence to and from Tribal governments and other consultation-related documents have been included in the Final Report (Appendix A Annex F) to demonstrate the fulfillment of Tribal consultation actions by the Corps as well as show the level of Tribal Government coordination.
FED _9-25-2013_1_USFWS	USFWS1: Although Alternative C has a greatly reduced number of total impacted acres compared to Alternative D (57,343 acres), it is still significantly greater than Alternative A (3,941 acres).	the Final Report provides an additional screening (section 3.9.3) based feasibility level WVA analysis. The conclusion of that analysis: Alternative D has the greatest habitat impacts (approximately 2,080 AAHUs more than Alternative C), highest mitigation costs, the lowest BC ration, and lowest net benefits. Alternatives A and C are comparable in total impacts, with Alternative A having a total impact of approximately 151 AAHUs less. Alternative C has less direct impact, while Alternative A has fewer indirect impacts. Both Alternative A and C are considered environmentally acceptable alternatives, and provide benefits to the same number of structures. Alternative C has the lowest total cost (including mitigation), the highest BC ratio, and highest net benefits.
FED _9-25-2013_1_USFWS	USFWS 2: To maintain hydrologic exchange/connectivity between the protected (interior) and non-protected (exterior) side wetlands, culverts are proposed to be included within the levee system. Currently, these measures have not been fully developed and there is still uncertainty and debate on whether maintaining existing flow/exchange can be achieved.	Hydrologic exchange/connectivity structures have been further developed and designed during feasibility-level analysis phase to reduce the uncertainty regarding proposed risk reduction system and its operation effects on water flows and exchange. The results of this design and operations can be found in Chapter 5 of this report.
FED _9-25-2013_1_USFWS	USFWS3: Interior drainage modeling (including rainfall) has not yet been conducted to determine if the proposed levee would increase the depth, duration and frequency of interior swamp inundation. The preliminary modeling on tidal exchange, which is not a driving factor for these swamps, showed some reduction in exchange between the interior and exterior wetlands and a slight lag time in the timing of tidal flows comparing the future without project (FWOP) and future with project (FWP) scenarios. If the proposed levee increases flood frequency and water depth, the bald cypress swamp will become further stressed which could result in a reduction in diversity, productivity, and vigor (Krauss et. al. 2009). Therefore, the U.S. Fish and Wildlife Service is concerned that the proposed levee may have deleterious effects on the interior swamp. The impacts to interior wetlands may be more greatly exacerbated with increased Sea Level Rise (SLR) because the hydrology would rely on a pumped system. The potential wetland habitat impacts to the largest remaining continuous forested wetlands in Louisiana would result in the reduction of resident fish and wildlife, reduced important wintering habitat for waterfowl and other migratory birds that use the Central and Mississippi Flyways, and reduced nursery habitat and detritus input important to the maintenance of estuarine-dependent fish and shellfish production.	Additional interior drainage modeling, including consideration of rainfall and increased sea level rise and subsidence (Relative Sea Level Rise), was conducted during the feasibility-level analysis phase. Results from this feasibility-level analysis was used in refining the hurricane and storm surge damage risk reduction system design and operation, and documented in the Final Report. Designs and structure operational guidelines will be further developed to avoid, minimize and reduce to the maximum extent practicable potential project-induced deleterious effects on enclosed wetlands. Unavoidable project-induced impacts would be subject to compensatory mitigation. This information can be found in sec. 4.1.1 Hydrologic Flows.
FED _9-25-2013_1_USFWS	USFWS4: In addition to the impact to water exchange in the protected-side swamp, the FWS is concerned about reduced future water exchange due to SLR requiring increased structure closures. The frequency and duration of gate closures is expected to increase due to area-wide stage increases caused by relative SLR thereby leading to potential substantial affects to wetlands enclosed by the levee system. These potential impacts have not yet been fully determined but are expected to be analyzed during the remaining feasibility phase of the study. By the end of the period of analysis (i.e., 50 years), under the high SLR scenario, all gates could be closed all of the time, similarly under the intermediate SLR scenario there may be almost complete structure closures. At present, it is unknown how water levels within the system would be managed so there is a potential for substantial additional indirect impacts to swamp and fish and wildlife resources to occur. Even with SLR we do not anticipate a corresponding increase in salinities; reasons for this assumption are addressed in our first specific comment.	Hydrologic connectivity would be maintained to the extent practicable through water control structures except during closure for hurricanes or tropical storms. When the system is closed, pumps would operate on average for 1.7 storms per year, which equates to a closure of structures on average 8.5 days per year. This expected rate of closure would be the same under a changing sea level rise conditions, due to the fact that the trigger for structure closures would be under tropical storm events and the elevation trigger would be adjusted as sea level rises. The recommendation only addresses hurricane and storm damages and the system would not close more often due to higher day-to-day sea level rise impacts. Any operational changes outside of the original project purpose; the reduction of damages caused by wind-generated and tide-generated waves and currents, would be considered a separate project purpose and authorization, and would require a new NEPA documentation and/or a permit approval for this operation change.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
FED _9-25-2013_1_USFWS	USFWS5: Developmental pressures on enclosed forested wetlands would likely increase with levee construction due to the reduced threat of flooding in the area but that would also be dependent on the proposed operation of pumps. According to the Corps Civil Works Program Five-Year Development Plan for Fiscal Year 2011 to Fiscal Year 2015, national flood damages are increasing and that is attributed to population migration to the coasts and development of floodplains, thus creating an apparent contradiction between flood damage reduction investments and national flood damages (Corps of Engineers, 2011). Stimulated development of the protected-side wetlands would not be consistent with the Corps of Engineers' plan to reduce flood damages and also utilize this area for flood storage capacity during storms exceeding the project design	Development will continue to occur throughout the area and into the future with or without implementation of the proposed action. The proposed action would not further induce development any greater than what is already occurring or would occur into the future without project conditions. The area has several thousand acres of undeveloped land, as well as undeveloped lots and acreage within existing subdivisions. Hence, there is no inconsistency between the USACE's programs for flood damage reduction investments and increasing opportunities for national flood damages. The enclosed wetlands are not a project feature and residual risk calculations do not include them for this project. Existing local building codes would still required developments to build above the 100 yr stage for rainfall impacts, and with an open levee system, the stage is still going to increase over time because of RSLR impacts. Existing local building codes would require significant amounts of fill material for new developments. These areas would still be in jurisdictional wetland and would required compensatory mitigation for impacting these areas. These two factors and the existing available upland areas for development; at a much lower cost, would limit the development in these areas. Additional information can be found in section 6.18 of the main report
FED _9-25-2013_1_USFWS	USFWS6: Another apparent inconsistency between programs is the planning of restoration projects at the same time levees are being proposed to enclose floodplain habitat and permits are issued for development in these floodplains. More consistency between these programs needs to address the conflicting approaches between restoration and future development. Therefore, the Corps and local sponsor should acquire adequate protection of the enclosed wetlands to ensure and maintain preservation of those areas in perpetuity via the purchase of non-development easements and local flood zoning ordinances	The USACE's planning teams for the LCA ecosystem restoration studies/projects (LCA Small Diversion at Convent/Blind River (CBRD) and LCA Amite River Diversion Canal Modification (ARDC) projects), the CWPPRA Maurepas Diversion study planning team and the WSLP study planning teams have been working with each other since the inception of each of these projects. For example, the environmental manager for both of the referenced LCA restoration projects and the WSLP study is the same individual who, along with other team members, have been actively engaged to ensure coordination with between these projects. The planning teams for the WSLP and CWPPRA Maurepas Diversion studies have closely coordinated including development of project features such as tying the proposed Maurepas Diversion guide levees with the WSLP risk reduction system features. Lessons learned from the LCA studies regarding the Maurepas Swamp ecosystem dynamics have been included into the WSLP study as part of the mitigation. The apparent inconsistency between these projects/programs is the need to provide hurricane and storm surge damage risk reduction for human populations at risk living adjacent to the Maurepas Swamp ecosystem that is presently undergoing habitat fragmentation and conversion to marsh and open water due to a number of natural and man-made problems. The WSLP Recommended Plan alignment minimizes, to the maximum extent practicable, adverse potential impacts to significant human and natural resources. The WSLP Recommended Plan includes measures to maintain hydrologic exchange/connectivity between the protected (interior) and non-protected (exterior) side wetlands. In addition, closure of the risk reduction system during storm events would prevent more saline waters associated with hurricane and storm surge events as well as increasing relative sea level rise levels from adversely impacting enclosed wetlands. Furthermore, the use of some of the enclosed swampland area for residual risk reduction in case of overtopping during storms exceeding project design would continue into the future. Any development of the area would require applicants to go through the Clean Water Act Section 404 permitting process to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Should development of the residual risk reduction area occur, appropriate mitigation would be required to offset the impacts to wetlands and the hurricane and storm damage risk reduction system and its operation.
FED _9-25-2013_1_USFWS	USFWS7: Opinions expressed at public meetings indicate there is wide spread local support for selection of Alternative D as the recommended plan. Alternative D is a westward extension of Alternative C ending at the non-federal Laurel Ridge levee in Ascension Parish if Alternative D is selected. Not only would the negative effects of Alternative C listed above be realized, but there would be substantial more wetlands (over 57,000 acres) impacted. Since Hurricane Katrina, the FWS and other state and federal agencies have indicated the need to integrate restoration and protection in coastal Louisiana. Two diversion restoration projects that would restore swamps would be enclosed within Alternative D, thus creating a direct and indirect conflict between restoration and protection if Alternative D were chosen. The FWS feels the integration of restoration and protection is important and believes that Alternative D would not realize this goal but rather would hinder it. In addition, the FWS feels a better use of the wetlands outside of Alternative C would be for restoration. Though Alternative C is not ideal, it achieves the goal of protection with fewer impacts to restoration to a far greater extent than Alternative D. The FWS provided an October 2013 Planning Aid Letter to the Corps that presented environmentally less damaging alternatives to Alternative D. The FWS acknowledges that impacts from our proposed alternatives are greater than Alternative C and potential impacts to proposed restoration projects would still exist. However, our alternative equates to less impacts than those anticipated to occur with implementation of Alternative D. If Alternative D is further evaluated, the FWS recommends that equal consideration and analysis be given to our suggested alternative alignment/approaches to D.	The USACE New Orleans District Commander selected Alternative C as the Recommended Plan based upon several independent sources of information, including: the analysis by USACE's WSLP planning development team, and State, Parish, public, resource agencies, and affected individuals and groups comments on the Draft Report. The WSLP planning development team has considered and coordinated ongoing restoration efforts in the Maurepas Swamp into the hurricane and storm damage risk reduction efforts to the maximum extent practicable. This is evidenced as described in response to comment USFWS6 by the close coordination efforts between the WSLP and the LCA CBRD, LCA ARDC and CWPPRA Maurepas Diversion planning teams. Regarding the USFWS's October 2013 Planning Aid recommendations and concerns, the USACE has selected Alternative C as the Recommended Plan in part to avoid potential adverse impacts to the LCA CBRD authorized project. In addition, the USACE will continue to coordinate with the State of Louisiana regarding proposed study of the Maurepas Diversion. Consistent with the USFWS's concerns for utilizing the wetlands outside of Alternative C for restoration, the USACE will also consider various compensatory mitigation alternatives which would complement and/or work synergistically with ecosystem restoration measures within the Maurepas Swamp.
FED _9-25-2013_1_USFWS	USFWS8: Saltwater intrusion (i.e., salinity associated with normal tidal cycles and not with tropical storms) as an issue is raised throughout the draft report. Please see our first specific comment regarding salt water intrusion within the project area.	Response: Please see response to USFWS specific comment regarding page 2-18-19 section 2.4.2 Vegetation Resources (USFWS10) below.
FED _9-25-2013_1_USFWS	USFWS9: Given that design and evaluation of most project features has been at a programmatic level, the FWS cannot fulfill its Coordination Act responsibilities at this time. The FWS recommends that further evaluation be conducted and another Draft Report be released to the public to allow review and comments on the feasibility level design of this project.	Comment noted: USACE had determined a 2nd draft EIS is not needed.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
FED _9-25-2013_1_USFWS	USFWS10: Page 2-18-19, Section 2.4.2 Vegetation Resources: The second paragraph of this section states that the "existing ... swamp habitats ... are rapidly converting to fresh marsh and shallow open water habitats due to impounding, saltwater intrusion, and a lack of nutrient and sediment inputs." The less than optimal conditions of the forested wetlands are primarily due to a lack of sediment and nutrient inputs. Although area swamps are not in optimal condition, they are also not "rapidly" converting to fresh marsh and shallow open water. Much of the Maurepas Swamp has experienced varying levels of degradation due to being virtually cut off from any freshwater, sediment, or nutrient input. With minimal sediment and nutrient inputs and moderately high subsidence there is a lack of recruitment and reduced growth. Though salinity spikes may be a final detrimental factor in an already degraded system for some of the Maurepas Swamps, according to Coastwide Reference Monitoring System (CRMS) stations in and near Alternative C, data clearly demonstrates that over the past 5 years (2008-2013) saltwater intrusion is not an existing issue for interior Alternative C swamps even though it is also listed as a concern in the Future Without-Project Conditions and water levels are increasing due to SLR and subsidence. The CRMS data also indicates that the interior swamp of Alternative C is not in as poor condition as the area to the west (interior of Alternative D) or especially farther north and near the lake rim. The Integrated Report does not account for the recently constructed Mississippi River Gulf Outlet (MRGO) closure which reduces salinities in the Pontchartrain Basin. The potential for saltwater intrusion is based generally on trends in areas other than in the swamps surrounding Alternative C. With the closure structure in place, proposed restoration projects, and the existing data on salinity it is debatable to what extent salinity will become a problem in the future even with low or intermediate and to some extent high SLR. To date, no modeling has been done to predict future salinity -levels for project planning purposes. The FWS recommends the removal of language that indicates a benefit of this project will be to prevent saltwater intrusion and to clarify the primary factors impacting forested wetlands in the study area.	The WSLP study area includes not only those areas enclosed by the proposed alternatives, but also vast portions of the Maurepas Swamp extending from the southern shoreline of Lakes Maurepas and Pontchartrain south towards the developed area along the Mississippi River within St. Charles, St. John the Baptist and St. James Parishes. Presently there are thousands of acres located between the south shore of Lake Maurepas to Interstate 10 that have converted to marsh and open water. For example the area just north of the raised portion of I-10 and adjacent to Alternative C alignment in that area that is several hundred acres of swamp that have converted to marsh and open water. Within Alternative C alignment west of Belle Terre Blvd there are several blocks ranging in size from a few acres to over a hundred acres of swamp which has converted to marsh and open water. As demonstrated in the LCA CBRD and LCA ARDC projects, there are several hundred acres throughout the enclosed Alternative C area that are in various stages of converting from swamp to marsh and open water. Located outside and to the west of Alternative C alignment the LCA CBRD project, which is within the WSLP study area, has demonstrated additional vast areas of swamp in various stages of conversion to marsh and open water. These surrounding degraded areas, in combination with altered hydrology and other factors will continue to influence the southern Maurepas Swamp area including the Alternative C alignment area. This widespread and rapid conversion of the Maurepas Swamp to marsh and open water has been analyzed and documented in coordination with the USFWS and other resource agencies, and determined to occur within portions of the WSLP study area within 10 to 50 years in various; this has been documented in the 2010 Final EISs for the authorized LCA CBRD, LCA ARDC studies. In addition, the 2001 "Diversion into the Maurepas Swamps" report prepared for the CWPPRA project specifically states: "This study also shows the impacts of saltwater intrusion on the cypress-tupelo swamps, including significant mortalities of tupelo, red maple and ash, and suppression of tree productivity in the areas of highest salinity. Saltwater intrusion in the Maurepas swamps is impacting swamp vegetations already stressed by excessive flooding." With regard to salinity, this report states: "For reasons elaborated above (Chapter 1), the south Maurepas swamps are at lower elevation than is "natural", and in addition, freshwater inputs to the region are limited mainly to the Tickfaw River, the Amite Diversion Canal, the Blind River, and rainfall/drainage. The region therefore is and will continue to be susceptible to saltwater intrusion whenever the limited freshwater inputs are diminished." Consequently, as the Maurepas Swamp continues to experience drainage problems and hydrologic isolation, continued inundation of vast areas due man-made logging canals and railroad embankments, the lower elevations of the area, and continued increasing RSLR rates, there will continue to be significant problems associated with salinity and inundation that diversions and input of freshwater and nutrients will not be able to ameliorate and the Maurepas Swamp will continue to fragments/degrade and convert to marsh and open water,
FED _9-25-2013_1_USFWS	UFWS11: Page 3-2 and 3-2, Section 3.3 and 3.4 Management Measures Considered and Screened and Initial Array of Alternatives (respectively): The FWS provided a Planning Aid Letter (dated October 2013) that requested alternatives to Alternative D be considered (see enclosure) that were less environmentally damaging. To date the Corps has not formally acknowledged consideration of these alternatives. If alternative D is further evaluated, the FWS recommends that equal consideration and analysis be given to our suggested alternative alignments/approaches to D.	Comment noted: Alternative D was not selected.
FED _9-25-2013_1_USFWS	USFWS12: Page 4-19. Section 4.36 Threatened and Endangered Species: Because this section also addresses species protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, we recommend that the title be revised to reflect these other protected species.	The section title was revised in Final Report to reflect discussion of protected species under laws such as the Migratory Bird Treaty Act and Bald and Golden Eagle Act
FED _9-25-2013_1_USFWS	USFWS13: Page 5-5, Section 5.3 Mitigation Plan: The report acknowledges that implementation of the TSP requires compensatory mitigation for unavoidable project-induced impacts. The FWS recommends further development of the appropriate mitigation to include minimizing and/or avoiding impacts to wetlands, State wildlife management areas, and State Scenic Rivers (i.e., Blind River) and developing compensatory mitigation plans commensurate with the level of planning conducted for flood risk reduction features, as mitigation is a project feature of the TSP.	Response: Concur. The Final Report includes a detailed Mitigation and Adaptive Management and Monitoring Plan (Appendix A Annex K) for unavoidable project-induced impacts to wetlands. Mitigation planning was and will continue to include coordination with the USFWS and other resource agencies, including the Louisiana State Maurepas Wildlife Management area personnel, and did take into consideration State Scenic Rivers such as the Blind River
FED _9-25-2013_1_USFWS	USFWS14: Page 5-6, Section 5.4 Adaptive Management and Monitoring: The Corps has acknowledged that the Adaptive Management and Monitoring Plan (AM&MP) has yet to be developed. The FWS recommends enough money be included in the AM&MP to sufficiently address potential hydrologic issues as well as impacts to restoration projects if necessary. Development of that plan should be coordinated with the FWS and other natural resource agencies	Response: Concur. The Final Report includes a detailed Mitigation and Adaptive Management and Monitoring Plan (Appendix A Annex K) for unavoidable project-induced impacts to wetlands.
FED _9-25-2013_1_USFWS	USFWS15: Page 6-1 and 6-2, Sections 6.5, 6.6, and 6.8 Endangered Species Act of 1973, Bald and Golden Eagle Protection Act of 1940, and Colonial Nesting Water Birds (respectively): If this project extends greater than 1 year, the FWS recommends continued coordination for potential impacts to threatened and endangered species, bald eagles, and migratory birds	The USACE will continue to coordinate with the USFWS. If the project extends greater than 1 year, the USACE will specifically coordinate with the USFWS with regard to potential impacts to threatened and endangered species, bald eagles, and migratory bird.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
FED _9-25-2013_1_USFWS	USFWS16: Page 6-2, Section 6.10 Fish and Wildlife Coordination Act of 1934: In this section, the Fish and Wildlife Coordination Act (FWCA) Report Recommendations are not included but rather are referred to in Appendix A. Please reference the Fish and Wildlife Coordination Act where it states the FWCA Report " .... shall be made an integral part of any report ..... submitted to the Congress or to any agency or person having the authority or the power ... 1) to authorize the construction of water-resource development projects ... " The FWCA Report is often misunderstood to be a part of NEPA. However, NEPA is not a substitute for the FWCA but represents an expansion of the FWCA concept that fish and wildlife values are to be fully and equally considered and appropriately mitigated in water resource development planning. The FWS recommends that the Corps include and address the FWCA Report Recommendations in the Main Report	Responses to the USFWS FWCA recommendations are included in Chapter 6 of the Final Report. The FWCA Report will be presented in its entirety in the Appendix A Annex G.
NGO_10-08-2013_1_Gulf Restoration Network	I am writing briefly to support a Lines of Defense alignment for St John and St James Parish, and against any alignments that impound undue acreages of wetlands, such as Alignment D.	Alignment D is not in the recommended plan.
NGO_10-08-2013_1_Gulf Restoration Network	We question the completeness of a document that does not outline the borrow sources for this levee system.	As discussed in Chapter 5 all borrow will be from the creation of the flood side ditch and protected side canal, and from the Bonnet Carrie Spillway
NGO_10-08-2013_1_Gulf Restoration Network	We question the completeness of a study about floodwaters that does not include hydrological modeling of surge waters, the potential for flooding from rain, and other parameters typically associated with storm risk reduction projects.	The final map annex includes maps showing the extent of the storm surge. Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authorization allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events.
NGO_10-08-2013_1_Gulf Restoration Network	We have seen that the Morganza to the Gulf levee will not be performing to the minimum risk reduction standard for federal insurance until 2035, due to the need to wait for the levee to settle into the soft sediments of the area. We feel that time is of the essence, and that ring levee alignments can protect human life more quickly.	Soil conditions are different than the Morganza to the Gulf Study area. The current recommendation used existing borings and collected additional borings to develop a recommendation that would maximizes net benefits consistent with protecting the Nation's environment.
NGO_10-08-2013_1_Gulf Restoration Network	The Corps should evaluate the risk reduction qualities of the cypress forests that are to be impacted, and produce a study of the actual storm likelihoods for the different alignments if the forests are included—for example, although the levee system is designed for "100-yr" or 1% protection, the Corps inclusion of the value of protective cypress forests could increase a given levee beyond this percentage	The impacts of the landscape changes can be seen by comparing the FWOP 2020 conditions to the FWOP 2070. Landscape changes are built into the surge modeling. By 2070 a large portion of the vegetated wetlands have converted to open water. Please see the Eng. Appendix related to storm surge modeling grid and assumptions.
NGO_10-08-2013_1_Gulf Restoration Network	As the Corps must consider cumulative impacts, we oppose construction of levees on existing impoundments of I-10 or highway 61. Just because flows to this area are hampered does not justify further damaging the system	Placing a levee parallel to an existing hydraulic barrier would actually reduce the potential indirect impacts to the enclosed area, hence reduce once source of cumulative impacts.
NGO_10-08-2013_1_Gulf Restoration Network	The impoundment and pumping of Cypress forests causes increases in drainage expenses over time, and these expenses are not included in the document.	There would be no additional cost to pumping due to the cypress swamp. The cost of pumping is based volume of water from a rain event. This would not change based on including the swamp. was included in the WVA. The team assumed there are enough openings for water exchange but developed a WVA that accounts for delays in water movement due to changes in RSLR over the life of the project.
NGO_10-08-2013_1_Gulf Restoration Network	We feel that the maintenance costs of these levees, including the induced subsidence and spiraling costs of drainage, are not adequately reflected in the document, and would lower cost-benefit ratios of alignments that impound undue amount of wetlands.	RSLR impacts are included in both the overall maintenance cost of the recommendation and WVA impacts.
NGO_10-08-2013_1_Gulf Restoration Network	We are concerned about impacts to the Blind River, an Outstanding Natural Resource Water, unique on the planet earth, as well as the Maurepas Swamp WMA.	Alignment D, which impacted Blind River is not in the recommended plan
NGO_10-08-2013_1_Gulf Restoration Network	The Corps must consider the induced surge that outward alignments, such as D, would have on towns like Springfield.	Alignment D is not in the recommended plan. It would be inappropriate to speculate about details of a scenario that is not recommended.
NGO_10-10-2013_1_Barry Kohl PhD	against any alignments that impound undue acreages of wetlands, such as Alignment D.	Alignment is not in the recommended plan.
NGO_10-10-2013_1_Barry Kohl PhD	This document does not constitute a Draft EIS because of the many omissions in the Report: 1) EPA has not submitted a CWA letter; 2) USF&WS report is not complete because the Service does not have adequate information from the Corps in which to respond (letter dated 6/5/13).	The Final EIS has all required information.
NGO_10-10-2013_1_Barry Kohl PhD	The environmental review process is piecemeal and the cumulative affects are not adequately addressed in the draft report, as required by NEPA.	The Final EIS has all required information.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
NGO_10-10-2013_1_Barry Kohl PhD	Will the public have another opportunity to comment on the content of the final report? Or, will it be sent to the Chief of Engineers for approval without further public input?	The final feasibility study report and NEPA document, and the proposed Report of the Chief of Engineers, have currently been released for State and Agency review, as required by the Flood Control Act of 1944 as amended (33 U.S.C. 701-1). After the final review period is over and once the Chief of Engineers signs the report signifying approval of the project recommendation, the report is forwarded to the chairpersons of the Senate Committee on Environment and Public Works, and the House of Representatives Committee on Transportation and Infrastructure. The project recommendation is still subject to project authorization, funding, and regulatory approval before construction can begin. The Corp will continue to keep the public informed of actions through notices in local newspapers, on the Corps website, and on social media sites. In addition interested parties can be added to a mailing list and receive notices on anything the Corps does in a parish.
NGO_10-10-2013_1_Barry Kohl PhD	How can an environmental evaluation be made if one of the most significant environmental issues of the project (the number and operation of environmental structures), have not been determined? The structures are necessary to preserve the environmental integrity of the enclosed wetlands. There should be a comparison for all alternatives.	More detailed hydrologic information regarding project features, including locations and design of culverts to maintain hydrologic connectivity, structure operations and how hydrologic connectivity of the Recommended Plan will be maintained is provided in this final report (Chapter 5).
NGO_10-10-2013_1_Barry Kohl PhD	The preliminary hydrologic modeling did not include rainfall. (Draft Rept., p. 4-1 & 4-11).	The final design includes rainfall impacts. Please see the Eng. Appendix
NGO_10-10-2013_1_Barry Kohl PhD	According to the Figure 2-2, the relative sea level rise (RSLR) in the project area will rise over 3.2 ft by the year 2070. This is an average (intermediate) rise with the highest projection being 4 ft in 2070. [Note: the data listed in Table 2.2 for low and intermediate RSLR do not match the curves in Fig. 2.2 for the year 2070.]	The table in the draft report had the correct information the finger has been corrected for the final report.
NGO_10-10-2013_1_Barry Kohl PhD	We question the Corps statement that gates will be closed only 8.5 days per year for the TSP. With the addition of RSLR how many days will they be closed based on the 3.2 ft rise of RSL?	The rate of closure is based on a historical storm frequency for the area. This rate would not change based on RSLR. When the system is closed, pumps would operate on average for 1.7 storms per year, which equates to a closure of structures on average 8.5 days per year. This expected rate of closure would be the same under a changing sea level rise conditions, due to the fact that the trigger for structure closures would be under tropical storm events and the elevation trigger would be adjusted as sea level rises. The recommendation only addresses hurricane and storm damages and the system would not close more often due to higher day-to-day sea level rise impacts. Any operational changes outside of the original project purpose; the reduction of damages caused by wind-generated and tide-generated waves and currents, would be considered a separate project purpose and authorization, and would require a new NEPA documentation and/or a permit approval for this operation change
NGO_10-10-2013_1_Barry Kohl PhD	The Corps has not addressed this issue in the Draft Report. Why not? The full impacts of RSLR have not been integrated into the plan nor has the hydrology and impacts of the levees and impoundments of the wetlands been evaluated for all the alternatives.	RSLR impacts are included in both the overall maintenance cost of the recommendation and WVA impacts.
NGO_10-10-2013_1_Barry Kohl PhD	American eels are highly sought after for the Asian market and provide an economic resource for commercial fishers. "If operating plan changes close the levee system more often due to RSLR then those impacts would have to be analyzed and documented in future supplemental NEPA document" (p. 4-18). The hydrologic modeling can be done now to predict future impacts for each alternative. Why wait? Study the impacts of increased closures based on the predicted RSLR.	The current authority only can only evaluate and addresses hurricane and storm damages. Hydrologic connectivity would be maintained to the extent practicable through water control structures except during closure for hurricanes or tropical storms. When the system is closed, pumps would operate on average for 1.7 storms per year, which equates to a closure of structures on average 8.5 days per year. This expected rate of closure would be the same under a changing sea level rise conditions, due to the fact that the trigger for structure closures would be under tropical storm events and the elevation trigger would be adjusted as sea level rises. The recommendation only addresses hurricane and storm damages and the system would not close more often due to higher day-to-day sea level rise impacts. Any operational changes outside of the original project purpose; the reduction of damages caused by wind-generated and tide-generated waves and currents, would be considered a separate project purpose and authorization, and would require a new NEPA documentation and/or a permit approval for this operation change.
NGO_10-10-2013_1_Barry Kohl PhD	Did the environmental costs of the various alignments include the mitigation and impacts to fisheries (American eel, etc.?). Degradation of the enclosed wetlands over time should be included as a cost. Also, impacts to important fishery species should be considered.	The WVA models are habitat based models not an individual species based model. The model looks at all the functions and value of the wetland, so impacts to wildlife and fisheries were compensated for with the mitigation plan.
NGO_10-10-2013_1_Barry Kohl PhD	"Borrow material would come from the Bonne Carre' Spillway or alternative borrow sources not yet identified." (Appendix B, p. 6). The draft report states that a canal will be dug along the new levee. Will the material dredged from the canal be used as borrow for the levee system? Will the borrow meet the post-Katrina soil standards used for federal levees? If so, this should be clearly stated in the final report.	As discussed in Chapter 5 all borrow will be from the creation of the flood side ditch and protected side canal, and from the Bonnet Carrie Spillway. The material not usable for the levee from the flood side ditch and protected side canal will be use for the creation of the mitigation sites in the Bonnet Carrie spillway.
NGO_10-10-2013_1_Barry Kohl PhD	We strongly support the incorporation of the post-Katrina engineering design criteria, especially the new soil standards, into the federal levees.	The design and cost are based on the new standards
NGO_10-10-2013_1_Barry Kohl PhD	Because of the inadequacy of the draft report, the NEPA process should be restarted when the Corps' "final report" is complete. This "final report" should be re-submitted as a Draft EIS to the agencies and the public for review and comment. This will allow a proper, comprehensive evaluation of the Corps TSP and other levee alignments.	Comment noted: USACE had determined a 2nd draft EIS is not needed.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
NGO_10-21-2013_1_Susan Vuillemot LEAN	Supports NEPA process but key considerations include enviornmental justice, sea-level rise and wetlands protection. Does not support Alternative D	Comment Acknowledged, thanks for your comment.
NGO_10-25-2013_1_Environmental Defense Fund	What are the true initial costs of the alignments, based upon adequate geotechnical analysis, and of future lifts?	Cost for the recommended plan are based on a detailed feasibility design. This included the inclusion of additional geotechnical analysis
NGO_10-25-2013_1_Environmental Defense Fund	How will the alternatives perform against a reasonable range of RSLR scenarios over the life of the project and beyond?	The actual future RSLR could impact the benefits achieved by any plan. Because the final recommendation was developed using the intermediate RSLR rate, the recommended plan would provide more benefits than anticipated should the low RSLR rate result and less benefits with the high RSLR rate.
NGO_10-25-2013_1_Environmental Defense Fund	How will they interact with diversions at Blind River and Hope Canal?	Alignment is not in the recommended plan. The recommended plan would not have impacts to Blind River. The levee for the recommended plan would include a pump station very near the beginning of Hope Canal to capture drainage from the community of Garyville. This location would be at the same location as the pump station associated with the Hope Canal Diversion proposal.
NGO_10-25-2013_1_Environmental Defense Fund	What will be the locations, sizes, initial costs and ongoing operation and maintenance costs, which must be assumed by the local sponsor, of the necessary hydrological structures?	Sizes and locations of structures are discussed in Chapter 5 and the Engineering appendix of the final report. O&M cost include cost for routine maintenance drainage structure replacement
NGO_10-25-2013_1_Environmental Defense Fund	How will wetlands enclosed by Alternatives C and D be protected from induced development?	Any enclosed wetlands would be subject to existing Federal, State, and local laws and regulations regarding development of wetlands. This would include, but is not limited to: the Section 404 of the Clean Water, Coastal Zone Management Act, as well as local zoning ordinances.
NGO_10-25-2013_1_Environmental Defense Fund	Will the project, especially Alignment D, induce surge in nearby communities like French Settlement, Killian, Ponchatoula and Manchac, and indeed in lakeside St. Tammany communities?	Alignment D is not in the recommended plan. It would be inappropriate to speculate about details of a scenario that is not recommended.
NGO_10-25-2013_1_Environmental Defense Fund	Where will the needed borrow be obtained and how will the environmental effects of borrow removal be mitigated?	As discussed in Chapter 5 all borrow will be from the creation of the flood side ditch and protected side canal, and from the Bonnet Carrie Spillway. Impacts from the flood side ditch and protected side canal are already included in the levee ROW and have been included in the mitigation plan. Borrow from the Bonnet Carrie Spillway will be from existing borrow pits.
NGO_10-25-2013_1_Environmental Defense Fund	How and where will the project imprint and project indirect effects be mitigated? We note with alarm that six years after construction began, no mitigation has taken place for the HSDRRS footprint. We suggest that one way to avoid that outcome is to design this project in conjunction with a mitigating project from the 2012 Louisiana's Comprehensive Master Plan for a Sustainable Coast or the Louisiana Coastal Area plan. We also suggest that such mitigation be undertaken not based upon traditional analysis, which fails to get at underlying systemic problems, but rather in a way that changes the trajectory of system function within the Maurepas basin.	Impacts will be mitigated concurrently with construction activates
NGO_10-25-2013_1_Lake Pontchartrain Basin Foundation	Supports Alignment C consistent with multiple lines of defense. A non-structural solution may not be adequate for the developed area of St. James Parish. A St. James Parish levee deserves consideration for the developed area of St. James Parish, but the D alignment has many significant problems, and so an alternative levee alignment should be further evaluated.	Alignments C-la and C-lb were review as part of the study process but they were not included because the alternatives would have similar benefits and cost as Alignment D. Also, the indirect impacts maybe limited with these Alignments but the direct impact were estimated to be greater due to the fact that the total length of the alignment is greater than D.
NGO_10-25-2014_2_Lake Pontchartrain Basin Foundation	Adequacy of the Feasibility Report and DEIS (SMART Planning Process) The key deficiencies: · The costs for the TSP and particularly for the alignment D alternative are likely to be vastly underestimated. Since there is no estimate of the number, types or operational considerations for water control structures, it is impossible to have any remotely reliable cost estimate for Alignment D. · There is no estimate of the induced flooding for any of the alternatives. This is particularly troubling with the locally preferred plan of the D alignment, in which surge storage equal to 12% the size of Lake Pontchartrain would be enclosed. This would increase surge into nearby communities such as French Settlement, and also increase surge from "lake tilting" to areas as far away as Mandeville and Slidell. · There is no projection of indirect wetland impacts. This is particularly troubling with the locally preferred plan of the D alignment, in which 50,500 acres of wetland forest would be enclosed, and under which, with future sea level rise, would increasingly require water control structures be closed to prevent residents from flooding. This future operation is inevitable with even modest seal level rise and would increasingly change the flood periods of the swamp.	Alignment D is not in the recommended plan. It would be inappropriate to speculate about details of a scenario that is not recommended. Additional discussion was added to the final report related to induce flooding potential. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .01-.02 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
NGO_10-3-2013_2_New River Soil & Water Conservation District	Supports Alternative D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
NGO_10-3-2014_3_New River Soil & Water Conservation District	Alignment C, if chosen and implemented will alter the programs and agreements the district has with local landowners.As of this date, the New River SWCD, and the local NRCS, has not been contacted by the U.S. Army Corps of Engineers to discuss a proposal which would cause such a drastic effect on the natural resources within the district.	Both Kevin Norton and Michael Trusclair with NRCS have been coordinated with.
NGO_10-3-2015_4_New River Soil & Water Conservation District	We also ask that you consider the negative effect Option C will have on endangered species such as the Correll's false dragonhead, a perennial that has been discovered here and has the ability to grow under current conditions and soil found in StJames Parish. Perique is a unique and rare type of tobacco that comes exclusively from St James Parish.	The Correll's false dragon-head is not a listed species (http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q1HD). Alternative C would have no impact on the habitat in St. James Parish where either of these two species of plant grows. The with out and with project impacts would be the same.
NGO_10-3-2016_5_New River Soil & Water Conservation District	StJames Parish is rich in history, natural resources, culture and traditions that are irreplaceable. Option C has the potential to abolish this therefore; the New River SWCD strongly supports Option D or Alternative Alignment C-lb.	The with out and with project impacts would be the same there would be no impact to the culture of St. James Parish due to the construction of alternative C. Alignments C-la and C-lb were review as part of the study process but they were not included because the alternatives would have similar benefits and cost as Alignment D. Also, the indirect impacts maybe limited with these Alignments but the direct impact were estimated to be greater due to the fact that the total length of the alignment is greater than D.
NGO_10-7-2013_2_Marathon Petroleum Company	potential to abolish this therefore; the New River SWCD strongly supports Option D or Alternative Alignment C-lb.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
NGO_9-10-2013_2_Scott Eustis	Concerned about expedited process	Comment noted
NGO_9-10-2014_3_Scott Eustis	Support a Lines of Defense alignment (Alternative A) for St John and St James Parish, and against any alignments that impound undue acreages of wetlands, such as Alignment D.	Concur, the Final Report provides an additional screening (section 3.9.3) based feasibility level WVA analysis. The conclusion of that analysis: Alternative D has the greatest habitat impacts (approximately 2,080 AAHUs more than Alternative C), highest mitigation costs, the lowest BC ration, and lowest net benefits. Alternatives A and C are comparable in total impacts, with Alternative A having a total impact of approximately 151 AAHUs less. Alternative C has less direct impact, while Alternative A has fewer indirect impacts. Both Alternative A and C are considered environmentally acceptable alternatives, and provide benefits to the same number of structures. Alternative C has the lowest total cost (including mitigation), the highest BC ratio, and highest net benefits. Alternative C would have less residual risk and increased safety, consistent with the 2006 USACE Interagency Performance Evaluation Task Force (IPET) report on the performance of the Performance Evaluation of the New Orleans and Southeast Louisiana Hurricane Protection System; and would minimize oil and gas pipeline crossings (36 crossings for Alternative C versus 70 crossings for Alternative A). This analysis show the Recommended Plan would comply with the Clean Water Action Section 404(b)(1) Guidelines as a least environmentally damaging practicable alternative.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
NGO_9-30-2013_1_Nucor Steel	NSLA is in the final phase of construction of a $750 million Direct Reduced Iron ("DRI") facility located in Convent, St. James Parish along the Mississippi River.Of the 150 team members, approximately 70% reside in the River Parishes and approximately 30% are from St. James Parish.Having seen firsthand, as recently as last year, the impact of flooding in the region it is imperative that the levee system be maintained/expanded to provide protection to the people and assets located in the Parish. We are currently analyzing the magnitude of potential impacts of flooding to our plant, the surrounding community, and to our teammates that live in St. James Parish.As the process moves forward, we will be engaged with other business leaders, Parish officials, and the community to fully understand the plan and how we may be affected. We would ask that the USACE evaluate not only residential impact but overall economic impact that flooding would cause on businesses and the employment in the area.	Thank you for the comment.
PAR_8-26-2013_1_Cleve Hardman	I am in receipt of your draft environmental impact statement (EIS) for the West Shore-Lake Pontchartrain Hurricane and Storm Damage Risk Reduction. The Division of Outdoor Recreation administers the Land and Water Conservation Fund (LWCF) for Louisiana. Our staff has identified seven LWCF-assisted sites within the project study area, one in St. John the Baptist Parish, six in St. James Parish and none in St. Charles Parish. Those sites are identified in the enclosed document along with GPS coordinates of each site. Our review of the draft EIS indicates none of the existing LWCF-assisted sites within the project study area would be impacted by any of the alternative plans. Indeed these sites are currently at risk unless action is undertaken to address the risk of hurricane and storm damage in this region. We stand ready to assist in any means possible toward realization of these efforts.	USACE appreciates the review of this document.
PAR_8-8-2013_1_Jason P Amato	support of Alignment D hurricane protection levee that will protect St. James Parish from flooding.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PAR_9-10-2013_1_Timothy P Roussel	The Study area seems to be based on political boundaries and not hydrologic boundaries. Why did the Corps not study the hydrologic basin and just a part of it based on political boundaries?	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authorization allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events. The study was not bound by political boundaries. In reviewing the existing storm surge damages reports and storm surge modeling data, the team determined that there are limited existing damages attributed to wind-generated and tide-generated waves and currents in the far western portion of the authorized study area. As shown in Figure 2-7 of the Main Report, the 100 year still water surge elevations for 2020-Intermediate conditions are less than 3 ft NAVD 88 outside of the political boundary of St. James Parish. Based on the surge modeling and post storm damage reports, the dominant causes of damages outside of St. James Parish are not from wind-generated and tide-generated waves and currents but rather from rainfall induced flooding. Addressing any damages in these areas would have to be addressed through additional congressional authorization or other existing study authorizations.
PAR_9-10-2013_1_Timothy P Roussel	Is the public going to be provided an opportunity to review the additional analysis will be undertaken during the feasibility level design and provided in the final report before it is submitted for processing?	The final feasibility study report and NEPA document, and the proposed Report of the Chief of Engineers, have currently been released for State and Agency review, as required by the Flood Control Act of 1944 as amended (33 U.S.C. 701-1). After the final review period is over and once the Chief of Engineers signs the report signifying approval of the project recommendation, the report is forwarded to the chairpersons of the Senate Committee on Environment and Public Works, and the House of Representatives Committee on Transportation and Infrastructure. The project recommendation is still subject to project authorization, funding, and regulatory approval before construction can begin. The Corp will continue to keep the public informed of actions through notices in local newspapers, on the Corps website, and on social media sites. In addition interested parties can be added to a mailing list and receive notices on anything the Corps does in a parish.
PAR_9-10-2013_1_Timothy P Roussel	The graphics should be larger so one can understand what they are supposed to portray.	Comment Noted. All Maps have been moved to a Map Annex and are larger

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PAR_9-10-2013_1_Timothy P Roussel	There is no mention in the infrastructure write-ups about the myriad of pipelines that traverse the study area.	The pipelines database was used on the formulation of plans. They were used as cost avoidance measure, and also included in the review of plans that met the objective of "reducing the risk of damage and loss of critical infrastructure". Impacts to pipelines were investigated in the study process but there was limited empirical data to show that there are storm damages to pipelines that are mostly buried. Impacts to pipeline facilities such as transfer stations that have if damageable assets, were included the NED benefits.
PAR_9-10-2013_1_Timothy P Roussel	The report needs to do a better job explaining why when any of the levees are built that you aren't making conditions upstream or in the neighboring parishes worse. In other words, explain where the water goes.	Additional discussion was added to the final report. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .01-.02 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PAR_9-10-2013_1_Timothy P Roussel	The benefit analysis seems to focus primarily on structures that are flooded, yet in the report it alludes to a number of other benefits that do not appear to be captured in the Economic Analysis.	Additional detailed has been added to the economic appendix
PAR_9-10-2013_1_Timothy P Roussel	In the report write-up there is not one mention of Perique tobacco. Perique is a type oftobacco from Saint James Parish, Louisiana, known for its strong, powerful, and fruityaroma.	The inclusion Perique tobacco as a crop damaged by storm surge was investigated in the study process but there was limited empirical data to show that the crop is damaged by storm surges events. When factoring in the probability of flooding (when and how often does flooding occur in a particular location) and consequences (potential damages associated with flooding), there is limited risk for damages to Perique tobacco from storm surges, due to the fact the crop is grown outside of the hurricane season.
PAR_9-10-2013_1_Timothy P Roussel	Has there been any thought given or analysis done for a scenario of protecting and preserving the wetlands on the interior of a leveed system and managing those wetlands which would also protect the 1-10 evacuation route and accomplish another study objective?	The team was unable to convince the resource agencies that any benefit would be attributable to preventing salt-water intrusion. Beyond that, the project cannot function outside of its future authorized purpose (to close during storm surge events). Any deviation from its authorized purpose would require additional authorization or an agreed modification to the operations plan for a multipurpose project, NED and NER. Alternative C is the recommended plan based on a NED analysis.
PAR_9-10-2013_1_Timothy P Roussel	Page 1-3, middle of the page -The write-up talks about the disrupted port logistics, blocked facility access and oil refineries being shut down. It also cites the spike in fuel prices and the agricultural losses due to storm surges. Where are the potential benefits for prevention of these with protection captured in the benefit analysis? If it is not captured and reflected in the economics, why was it not captured? Please explain.	Impacts to port logistics, blocked facility access and oil refineries being shut down were investigated in the study process but there was limited empirical data to show that these facilities have discernible impacts under the future without project (FWOP) conditions and the with-project (FWP) conditions, related to NED benefit losses. Impacts to these facilities were captured in the NED benefits if damageable assets (e.g. office buildings, warehouse, processing facilities) were impacted from storm surge. Shutdown losses related to high winds associated with tropical event are not captured in the NED benefits due to the fact that they would still occur without the recommended plan.
PAR_9-10-2013_1_Timothy P Roussel	Pages 2-2 and top of 2-3 - Does the sea level rise information used in the analysis reflect the latest information developed by NOAA and released in a report dated December 2012? Earlier this year there were articles in the newspapers indicating Louisiana's coast has some of the highest sea level rise in the world. How was this latest information factored into the development of the plan?	EC 1165-2-212 specifies equations to be used in computation of possible future sea level scenarios, based on an observed historical rate of sea level change. The equation used the most recent Intergovernmental Panel on Climate Change (IPCC) projections. http://corpsclimate.us/ccaceslcurves.cfm
PAR_9-10-2013_1_Timothy P Roussel	Page 2-4- There is no mention of General Andrew Jackson having dammed Bayou Manchac at the river in 1814, to prevent the British from gaining a backdoor entrance into New Orleans. Before being severed from the river, this distributary helped nourish the Manchac swamps sutTounding Lake Maurepas. That federal action (which was never authorized by Congress) has contributed to the eventual demise of many of the wetlands in the Maurepas basin. It was the source of fresh water from the Mississippi River that nourished those wetlands. Those wetlands helped dampen the impacts of storm surges over the years. The degrading over time mentioned at the top of page 1-4 is, to a large extent, due this federal action.	Commented noted

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PAR_9-10-2013_1_Timothy P Roussel	Page 2-9 Just before Table 2-5)- Field approximations sounds like somebody's guess and gives the impression there is a lot of room for error. Why were these not measured more precisely and surveyed? Bottom of page 9 -There are a lot of other industries and businesses in the study area, (such as the Nucor plant under construction, the Gramercy Aluminum plant [formerly Kaiser], the sugar mill, etc.), please explain why those cited were selected to be highlighted in the report and the others were not.	The term "Approximately" for both the # of structures and impacts were used due to the fact that there are always uncertainty in field collected data and modeling data. The structure inventory data was collected in 2011 and 2012. The final count may vary due to demolished structures or new construction which is why the term was used. For all residential and non-residential structures detailed was collected from field and GIS observations. Information included; Address, Photograph of structure, Type of structure (e.g., single-family), Type of foundation, Floor area, First floor adjustment (foundation height), Effective age, Quality of construction, Condition of structure, Style of structure (e.g., one-story), Type of exterior wall (e.g., siding), Type of roofing, Presence of garage, Presence of fireplaces (based on visible chimney). First floor elevations (FFEs) were estimated for each structure by adding the first floor adjustment collected in the field to the ground elevation of the structure. The first floor adjustment is the difference between the adjacent ground and the front door of the structure (typically, field teams use the number of steps to estimate this value). The ground elevation was obtained using a Light Detection and Ranging (LiDAR)-based Digital Elevation Model (DEM) for the northeast quadrant of the Convent quadrangle, from the Louisiana State University's LiDAR Atlas. Non-residential structures such as industrial facilities were included in the economic evaluation. The report only highlighted facilities that were at a high risk for damages (Risk = f [(Probability of Flooding) x (Consequences)]. Industrial facilities near the MS River levee that are above the 100yr floodplain do get damaged, but they occur at low probability events, 500 yr or greater.
PAR_9-10-2013_1_Timothy P Roussel	Page 2-11, top of page. - FIRMS are already being updated and insurance premiums are rising. Without levees and protection from storm surges, people will not be able to afford the flood insurance. The impacts cited are more direct than indirect if no action or the proposed action is taken.	Comment Noted.
PAR_9-10-2013_1_Timothy P Roussel	Page 2-12- Weren't portions of l-10 inundated during Hurricane Katrina? That should be addressed in this section since it impeded flood fighting, recovery and repopulation of the area. It also sounds like damages to transportation infrastructure would be a direct impact from no action. Wasn't one of the objectives of the study to reduce the risk of damage and loss of critical infrastructure, specifically the lmrricane evacuation routes? (See page 1-6)	Impacts to I-10 were investigated in the study process but in the review of the sections of I-10 in St. James Parish showed that when factoring in the probability of flooding (when and how often does flooding occur in a particular location) and consequences (potential damages associated with flooding), there is limited NED benefits to be gained. Flooding of large segments of I-10 does occur, but not until later in the study period. Even with flooding of the roadway, the impacts would only be temporary impacts. Large NED benefits related to roadway flooding are only typically gained when roadways are washed out and impacts such as road closures are long lasting. The loss of the I-10 twin spans after Katrina is an example of this scenario. The nature of the flooding in the future is not consistent with this condition. The inclusion of the potential transportation impacts in the report were included to show that there could be impact but they may not be related to a NED impact.
PAR_9-10-2013_1_Timothy P Roussel	Page 2-13 - The times cited in the table for potential transportation impacts are very optimistic. To those that actually experienced the problems with trying to go anywhere, it was much worse than you are indicating. Doubling those times would probably be more accurate. How was that incorporated into the economic analysis and benefits?	Comment noted. The times were based on just a change in distance traveled. Traffic would increase travel times. The inclusion of the potential transportation impacts in the report were included to show that there could be impact but they may not be related to NED impact.
PAR_9-10-2013_1_Timothy P Roussel	Page 2-26, 1.4.7 para 3 - It is noted that Tezcuco Plantation is in Ascension Parish which is outside of the "authorized" study area.	Reference was removed
PAR_9-10-2013_1_Timothy P Roussel	Page 2-29- The potential impact on pipelines should be included in the analysis. In one plan alone (Plan D), there are some 70 pipelines, many of them in St. James Parish which will essentially be outside the protected area if the TSP remains as the recommended plan. By not protecting and allowing storm surges there will be more rapid deterioration of those pipelines.	Impacts to pipelines were investigated in the study process but there was limited empirical data to show that there are storm damages to pipelines that are mostly buried. Impacts to pipeline facilities such as transfer stations, that have if damageable assets, were included the NED benefits.
PAR_9-10-2013_1_Timothy P Roussel	Page 3-7 and 3-8 - It is noted that neither Plan a nor Plan C reduce risk to infrastructure in St. James Parish. Simply put, Plans that do not accomplish this are unacceptable to us.	The localized storm surge risk reduction measures have been modified for the final report. The berms in the recommendation would provide additional risk reduction to infrastructure in St. James Parish, compared the TSP

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PAR_9-10-2013_1_Timothy P Roussel	Page 3-9 -We note that only Plan D provides a level of risk reduction to a segment of l-10 in St. James Parish. Since this is one of the objectives of the study and the only plan that satisfies this objective, why does this not lend added weight to Plan D being the tentatively selected plan? Please explain.	Impacts to I-10 were investigated in the study process but in the review of the sections of I-10 in St. James Parish showed that when factoring in the probability of flooding (when and how often does flooding occur in a particular location) and consequences (potential damages associated with flooding), there is limited NED benefits to be gained. Flooding of large segments of I-10 does occur, but not until later in the study period. Even with flooding of the roadway, the impacts would only be temporary impacts. Large NED benefits related to roadway flooding are only typically gained when roadways are washed out and impacts such as road closures are long lasting. The loss of the I-10 twin spans after Katrina is an example of this scenario. The nature of the flooding in the future is not consistent with this condition. The inclusion of the potential transportation impacts in the report were included to show that there could be impact but they may not be related to a NED impact.While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PAR_9-10-2013_1_Timothy P Roussel	Page 3-10 - Once again, it appears that your analysis is incomplete and you are providing costs based on various assumptions which could easily change when your analysis is complete. We request the opportunity to again review your results when you complete your WV A analysis.	Please see Chapter 3 which includes the WVA analysis was conducted using habitat measurements and planning and habitat team assumptions. The team used this information to to validate the assumptions used for the draft report.
PAR_9-10-2013_1_Timothy P Roussel	Page 4-2- Altemative C has the potential to increase stages to the areas exterior to the levee. This is a recognition of induced damages in St. James, Ascension, and Livingston parishes. Given that same logic, one can surmise that all ofthe altematives considered would do likewise. How is the Corps planning to mitigate those damages? The last statement of that paragraph seems to contradict what is being admitted earlier, but in a very non-definitive manner by saying it is not anticipated. It really sounds like you just aren't sure what will happen. We request that you provide a better explanation of your rationale.	Additional discussion was added to the final report. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PAR_9-10-2013_1_Timothy P Roussel	~ge 4-3 - You are saying here that there is no induced flooding based on your ADCIRC model. However, in other parts of the report you say there is induced flooding. Please explain and clarify.	Additional discussion was added to the final report. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .01-.02 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PAR_9-10-2013_1_Timothy P Roussel	Page 4-3- Since the levee alignment extends outside of the authorized project area into Ascension Parish, if this alignment were recommended, would it be acceptable to tie into a non-Federal levee that probably is designed to different standards that the current Corps standards? Where would the Federal project end, since the levee continues beyond the authorized limits of the project? A good explanation and clarification of this is requested.	Yes, would it be acceptable to tie into a non-Federal levee, but additional modeling would have to be conducted on the tie in point. In the case of Alignment D any induced stages on the existing non-Federal levee could not change the fragility of the existing levee. Any impacts would have to be mitigated for and the cost would be borne by that project. In most cases this would mean additional cost will be added to a project with no additional benefits. The federal project would still end at the tie-in point, after mitigating for any impacts. Also detailed modeling would have to show that any failure of the non-federal levee system, not related to the tie in, would not have any impacts inside the federal levee system's risk reduction area. In the case of Alignment D, additional modeling would have had to have been conducted to determine if storm surge from a failure of the non-federal levee would have entered the area behind Alignment D and impact structures.
PAR_9-10-2013_1_Timothy P Roussel	Page 4-6 -The impact of raising or acquisition of structures, particularly business structures impact not only employment but also negatively impact the tax base of the parish. There should be a map in this document that either shows the specific structures identified or at least the area where these structures are located. You obviously already know this since you claim to have a 100 percent inventory of the structures on the east bank of the parish.	The localized storm surge risk reduction measures have been modified for the final report. There are now a limited number of raising of structures in the Parish.
PAR_9-10-2013_1_Timothy P Roussel	Page 4 -7 -Section 4.2.4 Transportion It is noted that only Alternative D would fully meet the stated study objective of reducing the risk and loss of critical infrastructure, more specifically the hurricane evacuation routes that are critical for New Orleans and the surrounding area for evacuation and repopulation after a storm event. Alternatives A and C would not satisfactorily accomplish this. An impassible interstate/evacuation route could potentially also contribute to loss of life. It also directly impacts post storm response as well as repopulation of the area. There also does not seem to be any benefits captured in the analysis to reflect any of this.	Impacts to I-10 were investigated in the study process but in the review of the sections of I-10 in St. James Parish showed that when factoring in the probability of flooding (when and how often does flooding occur in a particular location) and consequences (potential damages associated with flooding), there is limited NED benefits to be gained. Flooding of large segments of I-10 does occur, but not until later in the study period. Even with flooding of the roadway, the impacts would only be temporary impacts. Large NED benefits related to roadway flooding are only typically gained when roadways are washed out and impacts such as road closures are long lasting. The loss of the I-10 twin spans after Katrina is an example of this scenario. The nature of the flooding in the future is not consistent with this condition. The inclusion of the potential transportation impacts in the report were included to show that there could be impact but they may not be related to a NED impact.
PAR_9-10-2013_1_Timothy P Roussel	Page 4 - 8 - online 4 "storm sure damage " should be "storm surge damage"	Change has been made
PAR_9-10-2013_1_Timothy P Roussel	Page 4 - 8 - Since this is a draft feasibility report, when are the feasibility level design efforts going to be accomplished? It would seem appropriate for that to have already be done as part of the feasibility report. Ifthis is going to be accomplished later, will the public be afforded an opportunity to comment and provide feedback? If not, please explain why not.	As part of the new SMART Planning process the USACE is releasing the report earlier in the process for the public to provide additional input into the USACE formulation process before moving forward on costly designs efforts.
PAR_9-10-2013_1_Timothy P Roussel	Page 4-13 - You state that the Floristic Quality Index being used throughout the world. Why then is it not acceptable to the Corps or is the WVA system of analysis so institutionally entrenched that it must also be done. This seems, on the surface, to be duplication of analytical efforts that the taxpayers are footing the bill for. Please explain what is actually required by your Corps' regulations and by law.	The Floristic Quality Index (Swink and Wilhelm, Plants of the Chicago Region, 1994) is a calculation that is made for individual long term monitoring sites that are part of the Coastwide Reference Monitoring System (CRMS) (http://www.lacoast.gov/crms2/Home.aspx). These numbers were then interpolated using best professional judgment to apply to a larger area. The Wetland Value Assessment (WVA) models are habitat based models not an individual species based model. The model looks at all the functions and value of the wetland. These models are pier reviewed and are certified to be used for USACE project in the Gulf region.
PAR_9-10-2013_1_Timothy P Roussel	Page 4-12 -It should be clarified that Blind River is a state-designated Wild and Scenic River since there is also a similar federal program	Addition has been made
PAR_9-10-2013_1_Timothy P Roussel	Page 4- 15 - Since you did not complete a WV A, what you are presenting in the report may or may not be on target. It appears that there was a lot of rationalization done to supplemental preconceived conclusions. Once again, we want to review your results after you have completed your WVA.	Please see Chapter 3 which includes the WVA analysis was conducted using habitat measurements and planning and habitat team assumptions. The team used this information to validate the assumptions used for the draft report.
PAR_9-10-2013_1_Timothy P Roussel	Page 5-1 -The 1571 structures including the 90 that would be bought out would have a significant disruptive impact on the communities in which these are located. More detail should be included in this draft plan and that should be publicly vetted. The Corps needs to be more sensitive to the people of the area and their communities.	The localized storm surge risk reduction measures have been modified for the final report. There are now a limited number of raising of structures in the Parish.
PAR_9-10-2013_1_Timothy P Roussel	Page 5-2, top of page- Suggest revising the statement to read" the BCR is 1.63 to 1 with benefits of approximately $23 million."	Section has been revised in the final version

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PAR_9-10-2013_1_Timothy P Roussel	Page 5-2 The local folks have a right to know if their property is slated to be acquired or raised. It seems like right now, you can't tell them because you really don't know. Why are you delaying doing this as part of the feasibility level design and analysis? Isn't this supposed to be a feasibility study? Why don't you have answers? The public has a right to know and if you haven't gotten far enough yet, you are premature in releasing this draft report.	The localized storm surge risk reduction measures has been modified for the final report. There are now a limited number of raising of structures in the Parish. The final feasibility study report and NEPA document, and the proposed Report of the Chief of Engineers, have currently been released for State and Agency review, as required by the Flood Control Act of 1944 as amended (33 U.S.C. 701-1). After the final review period is over and once the Chief of Engineers signs the report signifying approval of the project recommendation, the report is forwarded to the chairpersons of the Senate Committee on Environment and Public Works, and the House of Representatives Committee on Transportation and Infrastructure. The project recommendation is still subject to project authorization, funding, and regulatory approval before construction can begin. The Corp will continue to keep the public informed of actions through notices in local newspapers, on the Corps website, and on social media sites. In addition interested parties can be added to a mailing list and receive notices on anything the Corps does in a parish.
PAR_9-10-2013_1_Timothy P Roussel	Page 5-3- There is a sentence that states "the non-structural component would be less effective because structures would have to be raised to a height that would increase their risk from wind damage during a storm." That is not an acceptable solution because you are doing nothing but trading off water damage for wind damage but not realistically reducing the risk of our residents. In addition you are forcing them to accept paying higher premiums for flood insurance that no one can afford. This is problematic and unacceptable.	The localized storm surge risk reduction measures has been modified for the final report. There are now a limited number of raising of structures in the Parish.
PAR_9-10-2013_1_Timothy P Roussel	Page 5-6, top of page - When will the public have the oppotiunity to review the mitigation plan that is not included in this draft report?	The Final Mitigation Plan is included in the Appendix A of the final report. The final feasibility study report and NEPA document, and the proposed Report of the Chief of Engineers, have currently been released for State and Agency review, as required by the Flood Control Act of 1944 as amended (33 U.S.C. 701-1). After the final review period is over and once the Chief of Engineers signs the report signifying approval of the project recommendation, the report is forwarded to the chairpersons of the Senate Committee on Environment and Public Works, and the House of Representatives Committee on Transportation and Infrastructure. The project recommendation is still subject to project authorization, funding, and regulatory approval before construction can begin. The Corp will continue to keep the public informed of actions through notices in local newspapers, on the Corps website, and on social media sites. In addition interested parties can be added to a mailing list and receive notices on anything the Corps does in a parish.
PAR_9-10-2013_1_Timothy P Roussel	Appendix B Engineering Page 15- There is a reference to EC1165-2-211 dated 2009 but the latest guidance seems to be dated 1 October 2011 on the Corps publications web site. That seems to be indicate that the analysis used outdated information.	Potential Sea Level conditions are represented in the modeling system is consistent with the current USACE guidance. The EC was incorrectly cited and has been updated with the correct citation, USACE EC 1165-2-212 (2011)
PAR_9-10-2013_1_Timothy P Roussel	Appendix E Economics Page 1-3 of the main report talks about disrupted port logistics, loss production of refineries, agricultural losses, etc. Where are these benefits captured in the economic analysis for the project?	Impacts to port logistics, blocked facility access and loss of production at refineries from being shut down were investigated in the study process but there was limited empirical data to show that these facilities have discernible impacts under the future without project (FWOP) conditions and the with-project (FWP) conditions, related to NED benefit losses. We requested available information at the public meetings, but none of the areas large facilities provided information. Impacts to these facilities were captured in the NED benefits if damageable assets (e.g. office buildings, warehouse, processing facilities) were impacted from storm surge. Shutdown losses related to high winds associated with tropical event are not captured in the NED benefits due to the fact that they would still occur without the recommended plan. Agricultural losses were investigated but potential acres impacted were only identified through inundation maps, and land use maps. Studies in the past have captured benefits associated with damages to crops, but due to the nature of the crop this benefit category was not calculated and included in the NED category. The study area's major crop is sugarcane. Currently there is no empirical data to show that there are historical large scale losses of sugarcane crops in the study area. Damages to crops have to be evaluated through probabilistic method. With-out empirical data, determining flood losses associated with sugarcane is a complex determination due to the fact that is flooded sugarcane is not always total loss from storm surge flooding. If it cannot be used for sugar production, it could still be cut and reused as “seedcane". Cut flooded stalks or stalk sections, called billets, can be planted, and the stalk buds germinate and grow to produce the next crop. The use of flooded billets can help to offset the loss of sugar production vs. the cost for planting the next crop.
PAR_9-10-2013_1_Timothy P Roussel	The Initial Array of Alternatives (Section 3.4 page 3-3) identifies I2 alternative plansfor structural measures. Only 2 of the 12 plans include structural alternatives for St.James Parish. These plans are further discussed in Appendix E- Plan Formulation ofthe report. All of these plans refer to "Linkages to Past WSLP efforts"; however,none are more recent than 2007 (which predates Hurricanes Gustav, Ike and Isaac).Why are there no additional alternatives included in the study that take intoaccount recent storm or flooding events?	The past efforts covered a wide range of alignments. The team combined similar alignments and also included alignments which would have provided risk reduction to some of the most recent storm events.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PAR_9-10-2013_1_Timothy P Roussel	We request that the USFWS Alignments C-la and C-lb, or variations thereof, be added and fully vetted through this study process.	Alignments C-la and C-lb were review as part of the study process but they were not included because the alternatives would have similar benefits and cost as Alignment D. Also, the indirect impacts maybe limited with these Alignments but the direct impact were estimated to be greater due to the fact that the total length of the alignment is greater than D.
PAR_9-10-2013_1_Timothy P Roussel	How can the impacts and benefits of each Alignment be compared if the post development conditions are not modeled? Will building Alignment C have additional impact to St. James Parish? The study models only calculates storm surge with current conditions to set levee heights. Will flood elevations rise for St. James Parish if Alignment Cis constructed? We request pre and post development storm surge modeling be performed for all Study Alignments.	In general, the potential impacts to communities outside of the proposed levee alignment would be similar with and without Alignment C. Additional ADCIRC modeling will be performed during preconstruction engineering and design to determine whether or not there will be induced flooding and to precisely estimate its magnitude. At feasibility level of design, the model uncertainty and inclusion of localized storm surge risk reduction measures adequately address the limited potential for induced damages. See Chapter 3 in the final report for additional details. Alignment D is not in the recommended plan. It would be inappropriate to speculate about details of a scenario that is not recommended.
PAR_9-25-2013_1_Jody Chenier	Resolution requesting USACE reconsider alternative selection and choose Alt. D because D is about $10.2 m more, provides a continuous protection levee and protects all the parishes.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PAR_9-26-2013_3_Timothy P. Roussel	This letter is to officially inform the USACE that St. James Parish will be providing information that will change the Benefit to Cost ratio on Table 3-5. St. James Parish is collecting information from Parish industries to determine the economic impact to their facilities during and after a flooding event. These numbers and information will give the USACE a loss of production during the occurrence or aftermath of hurricanes or other surge events if St. James Parish is not included in proposed flood protection. Please be prepared to receive this information in the next few weeks to add to the continuing study of the tentative decision by the USACE. If you require any further explanation, please do not hesitate to contact us.	We requested available information at the public meeting, but none of the areas large facilities provided information. Impacts to these facilities were captured in the NED benefits if damageable assets (e.g. office buildings, warehouse, processing facilities) were impacted from storm surge. Shutdown losses related to high winds associated with tropical event are not captured in the NED benefits due to the fact that they would still occur without the recommended plan.
PAR_9-30-2013_1_Traci A Fletcher	I am writing to express my support of the Locally Preferred Alignment D alternative contained in the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study. I feel that this alignment would be in the best interest of all entities involved and would greatly support the livelihood of Ascension Parish, St. James Parish, St. John Parish, and St. Charles Parish. I appreciate the U.S. Army Corps of Engineers favorable consideration and support of Alignment D.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_10-11-2013_1_Lynda Williams	After experiencing the very close call of flooding by Hurricane Isaac in 2012, we cannot be jeopardized in any way by alternative plans that could create an environment of additional harm. Any combination of storm water and wind from the east creates a major flood worry to the Gonzales area. We already contend with major drainage from the Baton Rouge area.	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authorization allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events. While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_10-1-2013_1_James and Rose Lucas	We are providing you with pictures of our homes because you lack data from St. James Parish, What kind of data do you need to change your minds? Longview Subdivision is where we live and the pictures were taken during Hurricane Isaac. We didn't file FEMA claims because there was no damage. We didn't file because we filled sand bags by the thousands and set up temporary pumps.	Thank you for your comment and photos
PC_10-14-2013_1_Patrick Nerney	I urge you to reconsider and choose Plan D which would provide protection to my home and workplace. After experiencing the very close call of flooding by Hurricane Isaac in 2012, we cannot be jeopardized in any way by alternative plans that could create an environment of additional harm. Any combination of storm water and wind from the east creates a major flood worry to the Gonzales area. We already contend with major drainage from the Baton Rouge area.	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authority allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events. While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_10-17-2013_1_Ryan Donadieu	the Corps of Engineers tentative selection of Alternative C is a Band-Aid approach and will only delay the inevitable. Alignment D protects Interstate-10 which is a primary evacuation route for the state, vital economics for our country, St. James Parish, other areas of St. John the Baptist Parish and parts of Ascension Parish. The cost difference in construction is approximately $10 million by utilizing some of Alignment C to stretch across part of Alignment D instead of turning back towards the Mississippi River. If Alternative C is put in place and Alternative D must be constructed afterwards, the cost of Alternative D tying into Ascension and a constructed Alternative C would be a "start over" and the project would be over $800 million again. Our forefathers had the vision to see the importance of our Parishes to our nation and crawled through the mud to build a levee along the Mississippi River. We know there is a definite need for protection provided by Alternative D. Why put off until tomorrow what may be done correctly today for greater benefits?	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_10-18-2013_1_Cheryl and John Faucheux	Alternative D is the only sensible and feasible solution. Why does governments always do short sited projects. While $10M is a lot of money the difference between $881M and $891M is justified and so much less than elevating or buying (disrupting) properties. Water has to go somewhere. The force of surge in the lakes pushes water into rivers and over banks. If Alternative C is accepted water will just keep moving west and north and then we'll be back with another study and the price will be higher.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_10-19-2013_1_Carl Monica	In 1999 the Corps and EPA planned a diversion canal along a tract of land in Mt. AIry. Five Million dollars was spent on a study that championed the proposed development that would not only save the Maurepas Swamp, but also do several other important things, one being an improvement to Garyville and Mt. Airy's drainage. There are several ways to handle the levee in the Garyville area. A meeting of knowledgeable, un political people, in the Garyville/Mt. Airy area would certainly yield more credible ideas than has, so far, been demonstrated by the Corps.	Comment Acknowledged, thanks for your comment.
PC_10-3-2013_1_Robert P Ruiz Jr	As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_10-5-2013_1_Jared Mabile	I think it would be more feasible to build a pumping station in the Bonne Carre spillway the canals are already there all the water from Lake Maurepas has to drain out of Manchac Pass . If you can lower the levels in both the Lakes and put it into the Miss River it will ease all Flooding from Ascension, Livingston ,St James and St John Parish. I work on the River and it's at a low stage during all these storms and to me it makes more since to put the water where it belongs .If you build a levee it's still just putting a wall up instead of moving the water to a drain that was natural. building a pump station in the Bonne Carre spillway to pump water out of the lakes and into the Miss River would do more help for all parishes that border the lakes. I think the Hope Canal project is great if it can pump both ways	Comment Acknowledged, thanks for your comment.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_10-6-2013_1_Ryan Donadieu	I am having a hard time understanding the reasons for choosing such a reckless alternative. With Alternative C at $880 million and Alternative D at $890 million and only a $10 million cost difference is very minor in regards to the entire project. I understand maintenance costs of $500 million is a concern, however this is over fifty years. The difference between Alternative C and D is only $10 million in construction cost due some of the length of Alternative C being moved to stretch across some of Alternative D reducing the amount of distance for Alternative D.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_10-7-2013_1_Kristie Hutchinson	Alt. D is the only alternative that will provide protection to St. James Parish; important to select D as it protects people, properites and businesses.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_10-7-2013_1_Rhonda Lee	One of the components of the plan is to elevate and/or acquire 1400 residential and 90 non-residential structures (page 4-8) within Gramercy/Lutcher area. One can only assume that the Paulina/Grand Point area would also be included in these numbers. The report also states "implementation of the non-structural measure will be further developed and assessed during detailed feasibility-level design and provided in the final report. " I think that the details of elevation of homes and businesses need to be addressed now and not later.	The localized storm surge risk reduction measures have been modified for the final report. There are now a limited number of raising of structures in the Parish.
PC_10-7-2013_2_Alan P Cancienne	I live on the Lake side of HWY 3125. After the storm passed I didn't have water problems till the day after. It started rising and looked like it would not stop. It crossed 3125 on the south side, it took almost a week to go down. I think if Alternative C is picked over D, than St. James will get a lot more water on both sides of 3125 and it will take a lot longer to go down. Please consider Alternative D and protect both parishes. St. James has plenty room for growth. If the correct option is not picked, I think property values will suffer.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_7-26-2013_1_Garland and Sharon Poche	we implore you to consider ALIGNMENT D when making decisions about flood protection for the river parishes. If a protection levee is built only as far as St. John Parish then the flood waters from Lake Pontchartrain have no place to go but to our parish. Please think about the rich farmlands and major industries as well as households that would be affected by your plans. We pray that God gives you the courage to make the decision that will protect all people of our area from the danger of flooding from a major hurricane.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_7-26-2013_2_Dana Boudreaux	help me fight for flood protection of the homes of my family and friends by supporting Alignment D of the flood protection propositions.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_7-26-2013_3_Jennifer Madere	writing to ask that you help me fight for flood protection of our parish by supporting Alignment D of the flood protection fight.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_7-26-2013_4_Carol Bourgeois	Urge you to protect the residents of the East Bank of the Mississippi River by selcting Alignment D of the West Shore Lake Ponchartrain Hurricane and storm Damage Risk Feasibility Study	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_7-27-2013_1_Gaynell and Harris Louque Jr	Please help us by choosing Alignment D to provide hurricane protection for ALL the River Parishes, including St. James Parish.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_7-29-2013_1_Bernie Robichaux	implement Alignment D in regards to flood protection for St. James Parish. This will provide the most protection for the citizens of our parish.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_7-29-2013_2_David Robichaux	implement Alignment D in regards to flood protection for St. James Parish. This will provide the most protection for the citizens of our parish.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_7-30-2013_1_Chad M. Weidert	I am in support of Alignment "D" of the West Shore Lake Pontchartrain (WSLP) Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) Study.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_8-10-2013_1_Jamie Hoormann	impress upon the U.S. Army Corps of Engineers to implement Alignment D in regards to flood protection for St. James Parish.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_8-12-2013_1_TK NAPA	Please go with alignment D .	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-14-2013_1_Dean Louque	Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-14-2013_2_Hanson Hotard	Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-14-2013_3_Joseph Bienvenu	Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-14-2013_4_Cindy Martin	Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-15-2013_1_Marc St Pierre	Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-15-2013_2_Kenny Martin	Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-15-2013_3_Courtney Hines	Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-19-2013_1_Johnathan Copponex	Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-2-2013_1_Karen Dunn	Please support Option D in the proposed flood protection plans to protect St. James Parish residents.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_8-2-2013_2_Pastor Nolan W Albert	I am in favor of Alignment D for hurricane protection for St. James Parish.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_8-23-2013_1_Blake Luminais	The problem with the West Shore Lake Pontchartrain selection is that the water that is prevented from entering St John parish will enter the neighboring parish of St James, which will have no protection. St James' other neighbor, Ascension Parish, has high capacity pumps which will only add to the flooding of St James. .	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-24-2013_1_Dean Veron	Please consider Alternative D to provide flood protection to all of us who need it. It seems like the floods keep moving further to the west of New Orleans as the years go by since the levees were built/enhanced to protect the New Orleans area. If you choose Alternative C you are going to push the flood waters to St. James and Ascension maybe even to EBR parish. What gives you the right to protect St. John and St. Charles and not us? I PAY TAXES TOO!!! Spend the money and do it right the first time.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_8-24-2013_2_Michael Corona	Where will water go now? Will it go more North West towards French Settlement? Please responnd	The risk for induced flooded was much higher with Alignment D. As discussed in Chapter 3 of the Main Report and Planning Appendix; the team investigated the potential for induced flooding impacts associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_8-24-2013_3_Harrison Troxclair	I am a resident of Lutcher in St. James Parish, Louisiana. I disagree with the flood protection plan chosen by the corps of engineers (Alternative C) This may be the cheapest and best plan for St. John Parish but this will adversely affect St. James Parish should another storm similar to Isaac hits this area in the future. Storm waters that previously would spread out over a large area and not get very deep will be funneled into this parish and Ascension Parish. U.S. Highway 51 is one this area's major evacuation route but it is barely above sea level in this parish and has had water cover it in the past. Future water levels will be higher and possibly force closure of the escape route when needed most. There are industrial plants that possibly have dangerous materials stored at ground level that would be in danger of getting flooded and dispersed throughout this area,. Are the railroad beds elevated enough in St. James Parish to remain usable if the water level rises a foot higher than it did during Isaac? This proposed route of the flood protection system would only hurt this Parish and also Ascension Parish. "Protection" would not be the correct term to describe this projection for residents outside of St. John Parish. I urge whoever is in command of this project to reconsider the choice of Alternative C. I feel that this will be the death of the East bank of St. James Parish if this is the final route chosen Thanks for allowing the citizens affected the chance to comment.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-25-2013_1_Shawn Brignac	I was disappointed to learn that option D was not selected. I have been living in the Gramercy for 16 years now, and lived in St. John parish for 25 years before that. Last year's hurricane Isaac was not the worst conditions of rains and tidal surge I have seen since living here in Gramercy. In 1998 tropical storm Francis dumped 24 inches of rain on us and like after every storm the water came up for about three days after. A week later hurricane George hit as a category 4 storm and the water backed up on us for three more days after it had passed. Those two systems together did not backup half as much water on us like Isaac did. After Isaac past, we didn't have any water in the streets and in our homes like in LaPlace. The water came up for about a week after, because it had no where else to go. I am not an engineer so I can't tell you why it happen but I do know things are different since St. Charles parish has a levee. I would like to sell my house, but I have three other homes for sale just on my block that has been on the market for some time now. If we won't get a levee, I would like to be paid for my home.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-26-2013_1_Casey Laiche	I'm writing to express concern over the west shore hurricane protection levee. I have seen options A,B,and C which exclude St. James Parish. The people of St. James parish need to have Alignment D to protect ST.James parish on the east bank. For Hurricane Isaac we saw water like never before and the water rose up my drive way and up to my house, if any other alignment is chosen we will surely flood drastically. Personally I cannot believe you all are considering any of the other alignments because ascension parish has pumps and levees and if St. John were to get the levee, its obvious we will be sitting on our roof tops waiting to be rescued for the next storm. Thank you for you time.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-26-2013_1_Colin Babin	To ensure my family and property are secure during the event of a hurricane or tropical storm, I am requesting your assistance to promote the option Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-26-2013_2_Denise Nosacka	I beg for your support in choosing Alignment D verses the current choice. It saddens me that you would not choose to do the job right one time. If we should have the misfortune of another storm such as Isaac, and we will in time given our location in hurricane season, the current choice will cause dramatically more flooding in our area. This is an area that has not had such issues in my lifetime until now. This solution will help St. John parish just as the levee that was built in New Orleans helped them. And the neighboring parish paid greatly for that. The same domino effect will continue if you proceed as planned. I will pray that this decision changes and allows protection for ALL!	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_8-27-2013_1_Kurt Falgoust	I urge you to help achieve approval for option Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_8-27-2013_10_Melissa Brignac	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-27-2013_11_Christy Bourgeois	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_12_Toni Cambre	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_13_Aimee Brignac Daigle	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_14_Casey Laiche	Please Pick Alignment D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-27-2013_15_Peggy Vicknair	If a levee is built to protect St. John Parish residents only, the St. James Parish residents are not being protected. What will you do about us? We can't take water from St. John Parish and Ascension Parish without drowning.....	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_8-27-2013_16_Bridget Matherne	. It saddens me to know that the residents of St. James Parish are the only ones concerned about our small community. We have been forgotten by the Corps of Engineers and by our so called leaders. We are the only ones fighting for Alignment D. The only ones who wish to see our small community prosper and not suffer from future floods. I realize that this type of sentiment is not something that registers with the government. They speak in terms of money only. Well since the term community and family aren't enough to make a difference, let me throw out a few others things that may generate some consideration of the better option, Alignment D. Supplied Pictures of flooding, too.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_17_Joseph Berthelot Jr	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-27-2013_18_Walter Lambert Jr	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_19_Annette Poche	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_2_GARY J Martin Jr	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_8-27-2013_20_Alvin St Pierre Jr	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-27-2013_21_Terrie Hymel RN	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_22_Kirk Deroche	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_23_Melissa D. Becnel	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_24_Heidi Bourgeois	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-27-2013_25_Leroy St Pierre	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_26_JAMES LOUQUE	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_27_Karen K Scioneaux	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_28_Irene Melancon	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-27-2013_29_Edie Lambert	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surgerisk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_3_Connie Amedee	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_30_Mickey M. Bourgeois	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_31_Stacy Bourgeois	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_4_Janelle Schexnayder	no comment-blank email	No comment was provided

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-27-2013_5_Jed Bourgeois	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_6_Mason Bland	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_7_Kelly P Keller	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-27-2013_8_Doris Brignac	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-27-2013_9_Adrien and Andrea Delbasty	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-28-2013_1_Kent Rooney Hymel	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-28-2013_2_Garland and Sharon Poche	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localizedstorm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-28-2013_3_Mickey Vicki Lodrigues	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_8-28-2013_4_Donna Waguespack	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-28-2013_5_Larry Babin	As residents of St .James Parish and victims of the flooding caused by Hurricane Isaac, it is critical that you choose Alignment D. This is the only plan that will prevent our homes from being flooded again. We have been residents of Admiral's Landing in Paulina for over 34 years; our home is located adjacent to Hwy 3125. Flooding due to Hurricane Isaac caused us to be out of our home for over a week thus causing damage and repairs to become more extensive. Our family enjoys both our dwelling and neighborhood and have invested a lot of hard work, time and money over the years into making it our home. We urge you to choose Alignment D for our community to prevent the floodwaters from causing the devastation of Hurricane Isaac. Alignment D is the plan that will protect all parishes that were involve in Hurricane Isaac's flooding, PLEASE do not omit St. James' residents from your Hurricane Protection Plan.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_8-30-2013__Malbrough Wilson Jr	Seeing St Charles Parish having a levee protection system, and using pumps and now St John Parish getting ready to have a levee protection system and are using pumps and having Ascension Parish using 4-6 large pumps which virtually stop the water flow at Diversion Canal and Blind River. I have aerial pictures showing the line drawn in the water at this section in heaving rain times, where the dirty, sandy water from the Diversion literally cuts off the black water from Blind River. Even more proof is you can literally watch the levels in New River through Ascension Parish drop while the water levels in St. James slowly rise!! This is fact and I challenge you do perform your "study" on this. I have driven to Ascension to witness this, I have monitored the levels at Hwy 61 and Blind River. We do not need a levee miles away from our residents. We need a levee nearer the population so that we don't have to stop water in the swamps. The Plan "C" that is proposed to St John, if we tap into this plan and run north of Hwy 61 to Gramercy, then follow the East Bank Drainage Canal from Gramercy to Convent on the south side of the canal. This would give protection to all homes on the east bank of St. James Parish. Of course flow systems and or pumping systems would need to be evaluated in areas. Systems similar to what St, John Parish has done at Reserve Canal with a weir and pump systems. Bottom line is St James Parish needs assistance as other parishes, allowing surrounding parishes to develop flood protection plans and St, James Parish sits at a stand still, we "will" flood again, and again until you guys, the government give the needed assistance.	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authority allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events. The final plan has been modified to include localized storm surge risk reduction measures near the developed areas discussed in your comment.
PC_8-5-2013_1_Alvin Guidry and Ada Guidry	respectfully request you do the job you were elected to do and approve "Alignment D" to protect the entire East Bank of St James Parish from flood waters. Please help save our Parish and approve "Alignment D".	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-10-2013_1_Roland and Kenisha Anderson Jr	Please secure everyone with Option D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_10_Clyde Dooley	Has the Bonnie Carrie Spillway been considered as an option to handle the surge from the Lakes? The Spillway levees may need to be raised to contain the increased head elevation	Under storm events both the MS River Level and Lake levels rise. In most cased storm surge would not be able to be directed in to the river due to the elevated river levels.
PC_9-10-2013_11_Marcelle W Nelson	Study finishes in 2014 What next? How long before approved? How long after approved do you start building? We need to know how long before we get protection. Six month out of the year we have worry.	The final feasibility study report and NEPA document, and the proposed Report of the Chief of Engineers, have currently been released for State and Agency review, as required by the Flood Control Act of 1944 as amended (33 U.S.C. 701-1). After the final review period is over and once the Chief of Engineers signs the report signifying approval of the project recommendation, the report is forwarded to the chairpersons of the Senate Committee on Environment and Public Works, and the House of Representatives Committee on Transportation and Infrastructure. The project recommendation is still subject to project authorization, funding, and regulatory approval before construction can begin. The Corp will continue to keep the public informed of actions through notices in local newspapers, on the Corps website, and on social media sites. In addition interested parties can be added to a mailing list and receive notices on anything the Corps does in a parish.
PC_9-10-2013_12_Frank Fagut	Alignment D only/ Protect the wetlands from Salt water Intruision/ Protect I-10/ Protect the people of St. James and Ascension/ It cost less than 1 POTUS vacation and would cover the maintenace for 50 year.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-10-2013_13_Diane Smith	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_16_Stuart G Schultz MD	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-10-2013_17_Donna Maurin	Alt D seems to be the best choice in my opinion	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_18_Lowell Roussel	Requests impact studies on Diversion Canal and Sorrento Pumps	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authorization allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events.
PC_9-10-2013_19_Willie Vicknair	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_2_Kerry D Melancon	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_20_Don and Irene Melancon	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_21_Terry Brignac	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-10-2013_22_Lawrence Michel	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_23_David Michel	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_24_Jeannine Z Chauvin	I AM ALL FOR PROJECT D. It just make more sense that one would spend a little extra now. So we will all be safe from flood water. We work hard for our homes and a little protection could save all of us. Project D.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-10-2013_25_Ray E Hall	I am tired of watch the gov. water money. I am 68 years old and have paid taxes for many years. Alt. C only protects a few families compared to AlT D. To do Alt C and still have to do Alg. D is stupid. I hope you have more sense than that. If done right you dont have to raise houses in protected areas, and the wetlands can be saved. A fifth grader would pick Alignment D. Are you Smarter than a fifth grader?	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-10-2013_26_Andrea Vitrano	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_27_Michael B Guidry	Construct ring levees arounf high lands in both Parishes	The localized storm surge risk reduction measures has been modified for the final report. There are now a limited number of raising of structures in the Parish.
PC_9-10-2013_28_Henry T Graham Jr	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_28_Kim Minvielle	NA	No comment was provided
PC_9-10-2013_29_Stephen Myers	If the PLD will implement Alt. D, why does the Corps not work with them to coordinate plans? Short-term thinking on implementing Alt. C. Overall implementation on levee system over years appears to look at immediate political and small budgets rather than larger region impacts.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_3_Michael Lowry	Elect Alignment D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_30_Mildred A Blalock	Choose Alt. D. Alignment C is a short-term fix for only a few. Do the project right from the beginning, spend taxpaers' money wisely.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-10-2013_31_Gail Roussel	New Orleans to St. John Parish and Baton Rouge to Ascension Parish are protected. That leaves St. James unprotected. Government does not care about St. James-we need protection too	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-10-2013_32_Sherryl Myers	Please implement Alt. D. I have lived in Ascension Parish 62 years, I saw higher water levels after the last hurrican that I have ever seen in my area. I attribute this to backup water caused by building levees around New Orleans higher.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_33_Armand D Zucconi	I live in the Eden Isles subdivision in East St. Tammany Parish, and I am writing this to ask the Crop to consider building a levee and lock system that would help all of the Lake Pontchartrain Basin. The levee and locks would help St. John the Baptist, St. James, unincorporated sections of Orleans, and unincorporated section of St. Tammany Parishes.	Comment Acknowledged, thanks for your comment.
PC_9-10-2013_34_Ricky Roussel	Alignment D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_4_Derald Bourgeois	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_5_Frank Vitrano	Alt.D. is the only solution	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-10-2013_6_Michael Weber	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_7_Mary Roussel	Requests protection in St. James Parish	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-10-2013_8_Bennie Cashio	Could you send out hard copies to everyone in the Parish. Not all people have a computer.	Copies of both the draft report and final report are available at local libraries
PC_9-10-2013_9_Rusty Montz	If it is only 10 million more for Alt. D stop sending money to other countries and help the US citizen's first.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-10-2013_Andrea Delbasty_Shelley Donadieu	if I'm reading this Corps of Engineer report correctly, the whole purpose of the Hurricane & Storm Damage Risk Reduction study is to reduce the damages to the studied area. It's stated that the marshes(swampland) which protect the areas are reducing over the years turning marsh into open water which reduces our protection from storm surge. The cost difference between Plan C (which they chose & gives St. James NO Protection) & Plan D which INCLUDES St. James is $10 million. A lot if you just look at cost but what about protecting all the residents! Also mentions that with rising sea levels predicted over 50 years a storm event in year 2020 would affect 219 structures expected to increase to 1571. So if you are talking about reducing damages, look at that? Imagine the loss for those families! I would think that Plan C would cause even more flooding for St. James with all the water diversion. Plan D they state that the Corps is concerned about boxing in such large areas of wetlands. What about protecting our agriculture, cohesion of our community & businesses here? We have a lot of refineries here, that if were lost, would devastate not only our area but other parts of the country. Want to think about the cost of fuel then? Port of South Louisiana in the 9th largest in the world & runs from Baton Rouge to New Orleans! Why protect only part of it and not the whole?	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-11-2013_1_Scott Eustis	Concerned over coastal swamp impounding and how is Ascension parish's decision to do things the old, bad way impacting St James and what is the Parish plan to stop their flooding of St James	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authority allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events.
PC_9-11-2013_10_Chassity McCormack	blank email	No comment was provided

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-11-2013_11_Scott Louque	I currently live across the street from the Paulina Fire Dept. and last year in the weeks following Hurricane Issac, I saw this community come together like I have never seen before. For weeks crowds gathered at this fire station and I'm sure at other sandbag locations to fill sandbags and transport them to their houses. The kind of effort I saw those days after Issac made me realize just how special this place and this community is. There is no telling how many houses were saved because of that effort. I hope I never have to see this community come together and put forth that kind of effort ever again. However, if you chose Alignment C, I'm afraid I will and the outcome may not be so positive next time. For this reason, I hope you consider Alignment D to help protect this community and keep our homes safe from flooding. No community should have to come together like that and fill sandbags.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-11-2013_2_John Troxler	Please reconsider and support ALIGNMENT D, if ya'll look at all the concerns presented at meeting, I feel that D will be the best solution.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-11-2013_3_Andrea Delbasty	ALTERNATIVE D is the only option; your data you provided for your decision making is incompete.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-11-2013_4_Megan Oubre	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-11-2013_5_Harrison Troxclair	I attended the meeting in Lutcher last night and was prepared to make some comments to support option D but other speakers expressed concern on the same items, namely, flooding of US highway 61, flooding of La 641 which would deny motorists access to Interstate 10. There is also the possibility that flood waters could impact railway traffic. One thing that was not discussed was the location of St. James Parish Hospital. It is located in Lutcher and the Corps has stated that some homes would be elevated if option C is chosen. If it is anticipated that flood waters could reach a depth deep enough to require elevating homes in Lutcher, then the hospital would also be in danger of flooding. Even if the Hospital itself is not flooded, the roads leading to the Hospital would probably be impassable to vehicles should another storm similar to Isaac pass through this area with option C in place.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-11-2013_6_Randy Noel	I strongly support alignment D to protect St James as well as St John the Baptist Parish. It is only 10 million dollars more, much less than raising homes under the non-structural approach in C. I am a contractor and know the cost to raise a home in St James, which does not use pilings and has support footings in their slabs incapable of spanning point loads required to raise the homes. This cost could easily top $120,000 per home and at 200 homes and businesses would cost $14,000,000 more than alignment D. In the interest of the nation's taxpayers and for future protection of River Parish citizens Alignment D makes much more sense. Also alignment D crosses fewer pipelines further lowering costs. Interstate 10 is a major evacuation route and all efforts to protect it should be exercised.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-11-2013_7_Troy Louque Jr	We built our house 6 years ago and built it to a height that at the time was considered above flood stage. My family dating back at least to my great grand parents have lived in this area for over 100 years and no one had ever seen water like we had with Hurricane Issac which was only a minor hurricane. Many people (including myself) believe that it is due to the flood walls that were built along the coast to protect Plaquemines, St Bernard, & New Orleans. This wall is forcing more water into Lakes Ponchartrain, Maurepas, & then into the swamps around Blind River. I know that our community came together and helped each other fill and place sandbags around each others homes for 3 days and nights. We even had some local guys with dump trucks and backhoes dumping sand on high ground and then carrying the bags through the 18" of water to the homes that were in need. If it were not for this, there would have been many more home in St James Parish that would have taken on water. I believe that if the Corps of Engineers goes ahead with the planned alignment "C", it will only increase the chances of flooding in St James Parish and will increase the water levels. The reason I chose to build my house and stay in St James Parish is because I felt that it was about as close to the coast that I could get without really having to worry about flooding, and now it seems that it will be inevitable unless alignment "D" is chosen. I understand that alignment "C" makes more sense to the Corps when it comes to the cost to benefit ratio. However, it does not make sense to flood out a small community unnecessarily. I have heard that it will cost up to 500 million extra dollars over 50 years to build the "D" alignment instead of "C". In the long run, this is not a lot of money when you look at the big picture especially when you consider the billions and billions of dollars that are just given to foreign countries as "aid". The community of St James Parish, LA (Paulina especially) is full of hard working Americans that have worked their entire lives for what they have. Maybe someone could check the taxpayer to citizen ratio of our community(just to see how many of us are hardworking, tax paying American citizens that are not looking for government handouts, just the help that we deserve) as compared to the other communities that already have their flood control structures in place. The United States of America should find a way to help out its own people when they are in need. Please support "Alignment "D" and everyone on the east banks of the river parishes along with the agriculture, highways, & industries will be protected now and into the future.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_9-11-2013_8_Nolan Albert	I support Alignment D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-11-2013_9_Dana Brady	I am asking for your consideration to help PROTECT my parish that I love so much and I want to know that we have your support of Alignment D.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-12-2013_1_Paul Bair	Please see 24 comments under ID CD-9-18-2013_Vitter	Please see 24responces under ID CD-9-18-2013_Vitter
PC_9-12-2013_2_Matt Milazzo	My family and I are in support of Alignment D, this picture is of our home after hurricane Issac. In my 41 years of being a resident of St James parish I have never seen this much water in our area.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-12-2013_3_AJ Hymel	we need Alignment D to prevent St. James Parish from flooding. Ascension Parish is pumping water into the Diversion Canal which is causing Blind River to stay high in the Gramercy Area. When Isidore hit last year Blind River flooded over Hwy 61 in Gramercy making it not passable. Also, the Entergy Power Station across Hwy 61 from Noranda Aluminum in Gramercy had to be sand bagged due to the high water in that area. We had to wait an extra day for electricity because of the power station having to be sand bagged. If Alignment D is not implemented St. James Parish will be flooded like St. John Parish. Alignment D is the only option that will provide hurricane levee protection to St. James Parish citizens	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authority allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events. While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-12-2013_4_Barry Weber	Building a levee in St. John Parish and not protecting St. James Parish will put water in St. James Parish where water never has been and flood people who should never flood. With the pumps in Ascension Parish to our west and a levee in St. John Parish to our east the water will be funneled into St. James Parish and settle at elevations it should never reach. . If Alignment C is chosen the next flood will be catastrophic in St. James Parish. The decision then will be to extend the levee from St. John Parish into St. James Parish which will cost a lot more down the road. Why be reactive and put people and industry in termoil when we can be proactive and save people, property and the local economy. We have 2 major oil refineries with 15 miles of each other, one being MOTIVA on the north side of ST. James Parish and Marathon in St. John Parish. A hurricane will cause these refineries to shutdown. Getting started back up will be a priority not only for our local area but for our nation and national security. We have a large portion of our population who work at these facilities. These plants will be depending on all of their employees to be able to respond as soon as possible to repair any damage and bring these refineries back on line. If these employees are fighting to protect their homes from flooding, and caring for their families they won't be able to work at their jobs. The flooding will also affect travel, I-10 in St. James Parish will be under water and not be passable, also US 61. Both of these highways were under water in the aftermath of Hurricane Issac. Not protecting St. James Parish with Alignment D will put more water on these highways and keep them impassable for a longer period of time, keeping people from getting to their jobs and slowing down the recovery process. These refineries also depend on our highways for support businesses to provide what these refineries need from the outside to start up and run. I worked at MOTIVA and am now retired. After Hurricane Katrina we repaired our damage and was ready to start up and run after 2 weeks, but a major concern of ours was getting support businesses who supply us with things like acid, catalyst which we need to run to be able to get it to us. We assisted our suppliers anyway we could so we would be able to get back on line. Remember, staying with Alignment C, you will be causing people to flood who under todays circumstances would never see water. You will be creating a much larger problem than we have now.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_9-12-2013_5_Paul Leblanc	ALIMENT D IS THE ONLY LOGICAL WAY TO DO IT. IF YOU WERE LIVING IN ANY OF THE PLACES THAT THE LEVEES WERE GOING TO BE BUILT YOU WOULD WANT YOUR HOME AND LAND TO BE PROTECTED	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-13-2013_1_Blane Deroche	I hope you will reconsider the draft proposal and choose Alignment D to provide full protection to St. John, St. James and Ascension parishes.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-13-2013_2_Siggy Martin	After hurricane Karina, there were obvious reason to build protection for a city that "submerged" after the storm … there were numerous projects in New Orleans and nearby areas … there were things done in Jefferson, and in St. Charles parish a levee was built from Kenner to the east levee of the Bonnet Carré spillway. I think that hurricane Isaac was the first "test" of those improvements. I'm not an engineer, nor did I do a study to evaluate what happened, but what did happen is that we had water in St. James Parish (and St. John parish) where we NEVER had water ANY time for ANY storm, no matter the strength or speed of movement! Hurricane Isaac was a very small hurricane (bottom of scale of a category 1), and although it did move slowly, that was NOT the reason we got all this water. Obviously, it was because the water couldn't go where it did before … it was "funneled" to St. John and St. James parishes, both of which are relatively low elevation areas. It's not rocket science. Again, I understand cost, and I realize there are not "as many" people here as in St. John parish …. But guess what … we are all "people" …. We are as deserving protection as much as St. John Parish, or the city of New Orleans, for that matter. And purposely knowing that you would be flooding a lot more of us to save St. John parish and "purposely" excluding St. James parish .	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_9-13-2013_3_Pam Brignac	I am begging you to please consider alignment D for levee protection.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-13-2013_4_Sandra Barbier	I had some house flooding in Hurricane Isaac. It was the first time I ever experienced house flooding and it was especially frightening when I didn't know how high the water would get. Neighbors who lived here longer than I say this is the first time my area (Riverlands Subdivision) has flooded. I am undecided whether levee protection north of the community is necessary, but I am certain the restoration of wetlands along the shores of Lakes Pontchartrain and Maurepas is. Those wetlands are essential to protecting communities such as Laplace, as essential as any levee. I am sure you also know the benefits of wetlands in lessening storm surge and weakening winds. Even if levees are built, it is imperative that the wetlands be restored. Experience has cruelly shown that levees cannot be relied upon for total protection: levees can fail. Besides failure, which can result in catastrophic losses, levees are: costly to build and maintain; they require the addition of drainage stations, which St. John until now has had the luxury of not needing, and which are also costly to build and maintain, can fail and require building safe houses for crews if they are to man the stations at the most critical times. Levees lower residents' guard against protecting themselves from storms, inducing them to stay when they should evacuate and greatly raising the potential loss of life. Levees that enclose undeveloped land, especially wetlands, as the Corps' favored alignment in St. John does, encourage even more construction in vulnerable areas, putting more people and property at risk. Levees that destroy wetlands or make wetlands feasible for development are also contrary to the entire idea of protecting and restoring wetlands. As such, they are a misuse of public funds. I favor the alignment which stays closest to already developed areas of Laplace. I also support the idea of ring levees, which provide protection with fewer of the negative effects of a levee. Such a plan provides protection and does not put more people at risk. In my opinion, those who favor other plans are more interested in the expansion of land development, including development into wetlands, than they are in protecting residents. An alignment that encloses undeveloped land, especially wetlands, may appear more cost-effective now, but in the future will only raise the costs of protection, increase the number of people at risk and greatly increase the dollar value of storm damage.	The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment.
PC_9-13-2013_5_Joseph Berthelot Jr	ALTERNATIVE "D" IS THE ONLY LOGICAL PLAN TO CHOOSE. After hurricane Katrina devastated New Orleans levees, the Corps of Engineers came to St. James Parish for the materials (dirt) to rebuild the levees. St. james Parish has the dirt the Corps needed. This dirt has the correct amount of clay needed to build levees. A huge dirt pit was created in Grand Point and this materials was shipped to New Orleans for their levees. This should be considered as plus for saving our parish. The transportation cost would be much lower as the distance is much less to transport it. Also it would be immoral to take this dirt and build the levees in St. John Parish and leave St. James Parish without levees.	Cost for borrow were developed based an normal haul distance. For the purpose of the feasibility study all borrow was assumed to come from the Bonnet Carrie Spillway and from the excavation of a drainage and environmental control canal. While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-14-2013_1_Anita Michel	If only St. John Parish is protected it will destroy St. James Parish. This is a chance to help all the river parishes, lets not make into a flood war. I spent the last hurricane sandbagging for 4 nights & it was terrible. Please be responsible & do the right thing.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-15-2013_1_GARY J Martin Jr	I would like for the corps to consider alignment D. Durning hurricane Isasic we were at the grand point fire department for three days filling sandbags for people. We unloaded 21 twenty yard trucks of sand and filled approximately 150,000 sand bags for residents who needed them. We had roughly 100 people every day and night filling sand bags. People came out with trucks and trailers willing to deliver sand bags to whoever needed them. I don't understand how the federal government can say that St.James parish did not meet the necessary qualifications for federal aid because they go off of insurance claims to make that determination. How can someone sit back and watch their neighbors homes flood just so we can meet some kind of quota to get federal aid. The Paulina Grandpoint Belmont volunteer fire department is a decontamination site for Waterford 3 for emergency personnel and the fire department has to be up and running in order for Waterford 3 to start up after hurricanes. If alignment C is used and the Grandpoint fire department floods then Waterford 3 will not be able to start up which will put a huge set back in restoring electricity to the people and industries in south Louisiana.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-16-2013_1_Karen Dunn	If Alignment D isn't put into action for St. James Parish, Alignment C has non structural provisions, but they are not immediate and span over multiple years, even decades. The flooding could and/or will be induced and would occur at a much faster pace. This puts lives in danger and subjects us to repeated losses. A life is irreplaceable, end of story. Have your calculations factored in and included multiple claims for our area? Senator Vitter put a percentage of those additional miles of levee costing a mere 7% budget increase over Alignment C. The Levee Board is onboard in support of Alignment D....If federal, state and local governing agencies support Alignment D, I don't understand your hesitation to provide us the protection we seek to preserve lives and to continue our way of life with peace of mind. You have the power in your hands to do the right thing by St. James Parish, I beg of you to make Alignment D your choice.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_9-17-2013_1_Tina and Sean Ory	I am writing in regards to the building of levees to protect St. John Parish from future flooding. My husband Sean Ory and I have two homes here in LaPlace. Our families have lived here for over 40 years. We are asking for levee protection in the event of flooding. We along with our extended family have so many homes here that need protection. We were lucky that only 2 of the homes in our family were flooded during Hurricane Isaac including the one we lived in on Rienzi Drive. We were smart enough to purchase flood insurance after Hurricane Katrina even though we don't live in a flood zone. We are praying that the levees get built and built in a timely manner. We cannot afford to pay higher flood insurance. Our homeowner's insurance is high enough along with the large house notes. Since we have 2 homes to pay for and worry about we are even more concerned for our family and our property. We would also like to express that we feel that the levees should extend to protect St. James Parish as the flood water that we will be blocking will go to them. We feel it is only fair and not that more expensive to include their protection.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-17-2013_2_Andrea and Adrien Delbasty	Support Alternative D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_9-17-2013_3_Sheffard DeRoche Jr	As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used bythe U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance topromote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment Dis the only option that will provide leveehurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during theevent of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join towork towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration ofthis very important matter.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-17-2013_5_Myra	I am in support of Alignment D. There were areas of St. James Parish that have never flooded in the 54 years I have lived here, until last hurricane season.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-17-2013_6_Jackie Siears	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-17-2013_7_Becky Price	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-17-2013_8_Adrien and Andrea Delbasty	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-17-2013_8_Adrien and Andrea Delbasty	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-18-2013_1_Deidra A Taylor	I am a lifelong resident of St. James Parish, and I strongly urge you to implement Alignment D which includes storm surge protection to St. James Parish. To me, it does not make any sense to build a levee for flood protection that would help some parishes and where that levee stops, it would drastically and negatively affect the very next parish. In other words, what would be avoided in St. Charles and St. John Parishes would devastate St. James Parish. Just recently, during Hurricane Isaac, St. James Parish experienced flooding in some areas. We, the residents of St. James Parish, certainly do not want to experience the nightmare that occurred in St. John Parish during Hurricane Isaac.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_9-18-2013_1_Elaine L St Pierre	As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-18-2013_2_Aubrey St Pierre	Supports Alternative D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_9-18-2013_2_Casey Laiche	I am writing to ask to overturn alignment C and to go with alignment D which will protect everyone from lake surge and flood waters. I live in Lutcher LA and for hurricane Isaac we had water like never before, If you all decide to stay with we alignment C we WILL FLOOD. Please reconsider we all deserve alignment D.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-18-2013_3_Natalie Robottom	I am a lifelong resident of St. James Parish, and I strongly urge you to implement Alignment D which includes storm surge protection to St. James Parish. To me, it does not make any sense to build a levee for flood protection that would help some parishes and where that levee stops, it would drastically and negatively affect the very next parish. In other words, what would be avoided in St. Charles and St. John Parishes would devastate St. James Parish. Just recently, during Hurricane Isaac, St. James Parish experienced flooding in some areas. We, the residents of St. James Parish, certainly do not want to experience the nightmare that occurred in St. John Parish during Hurricane Isaac.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-18-2013_4_Kenneth Ragas	As levees are built to protect additional areas from storm surge produced by hurricanes and tropical storms the surge is diverted to the next area of lease resistance. Storm surge will always build in the Breton Sound area due to the counter clockwise mechanics of tropical storms in southeast Louisiana. Eventually the Mississippi River will be the path of least resistance which will cause surge to travel upriver and top the river levees in the New Orleans area and upriver. Hurricane Katrina caused the Carrollton Street river gauge to rise to 15'. The NOLA levees are about 17'? The only way to reduce storm surge formed in Breton Sound is to direct it through large spillways across the Mississippi River Delta. The surge produced by hurricane Isaac flooded Braithwaite, Laplace and the north shore. This was partly due to the levee/wall construction after Katrina in St. Bernard and New Orleans.	Comment Acknowledged, thanks for your comment.
PC_9-19-2013_1_Bonnie L Poche	I am requesting that the US Corps of Engineers re-evaluate its tentative decisionof Alignment C and promote the only Alignment (ALIGNMENT D) that will alsoprovide hurricane levee protection to the residents, industries and highways of St.James Parish.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-23-2013_1_Kurt Roussel	As Chief of the Paulina Grand Point Belmont Volunteer Fire Department we are the emergency worker decontamination for Waterford 3 located on the westbank of St. Charles Parish. Our station on La 642 was close to flooding during Hurricane Issac. Our station is a designated location and has to be up and running in order for the Nuclear Plant to be restarted per emergency plans. When Hurricanes hit our area we have to be running. When Issac hit I was in constant communication with Entergy Command in Jackson Mississippi as to when we would be available (Dry and Power) to start operations. In the event we are flooded the plant could not get up and running supplying over 10% power to the grid for restoring services. I hope this is taken into consideration in support of alignment D.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-23-2013_2_Richard St Pierre	1) Has the flood model used by the Corps been updated to simulate what happened during Hurricane Isaac? An unvalidated model cannot answer the following questions: 2) Unless this has been done, how can we have any confidence in its predictions? 3) How will the required height for the new levees be determined? 4) Even if residents choose to elevate their homes, how high will be high enough? 5) Elevated homes may sound good to the Corps, but consider the following: a) If one stays home, how can one get out if the streets are flooded for days? b) If one chooses to leave, how long will it be before they can get back home with flooded streets? c) In cases of emergencies, how does one get medical help if all streets are flooded? 6) What does St. James Parish Hospital do to protect itself from flooding? I doubt it can be elevated. 7) How are I-10 and Highway 61 kept open for emergency evacuations?	(1,2, &3)The model has been validated through multiple reviews and the model uses multiple hypothetical storms, based on different past and future storm parameters. Over 300 different are run to develop the stage frequencies. These storms are based on a common technical framework for all Federal Agencies involved in assessing hurricane-related threats to coastal communities. Risk analysis and associated uncertainties are based on storm frequencies and not on a particular storm (e.g. Betsy, Katrina, Rita, Isaac). Designs are based on the risk analysis, stage frequencies, and Hurricane and Storm Damage Risk Reduction System Design Guidelines (HSDRRS). See http://www2.mvn.usace.army.mil/ENG/PageA.asp. (4)The final localized storm surge risk reduction measures have been modified for the final report. There are now a limited number of raising of structures in the Parish, but residents can always on their own choose to elevate their homes to further reduce their risk from damages in the future. The level elevation required to remove a structures from high frequency damages (100 yr and below) will vary based the location of a structure in the study area and also will vary on when the evaluation is conducted (e.g. 2020 vs 2070). Please see the 2020 and 2070 inundation maps presented in the final engineering appendix for a graphical representation of this effect. 5) a., b. & c.)When severe weather strikes it's critical to think about your safety and your family's safety. Local emergency planning is the responsibility of the State of Louisiana and local municipalities. The USACE encourages you to listen carefully to the direction of local officials and prepare to evacuate if it becomes necessary. Only stay at home if you have NOT been ordered to evacuate by local officials. Listen to local officials and be ready to evacuate. Evacuation plans by locals should be enacted well before the occurrence of storm surges into an area. Residents could be requested to evacuate even behind a levee. The main purpose of a levee is for the protection of property not life or limb. Durations of flooding in street will be highly depended on the type of storm event. Access may be limited into areas for other reasons not related to flooding (e.g. debris, downed power lines). The State of Louisiana's Emergency Preparedness Guide states that "You should be prepared to sustain yourself and your family away from your home for several days or, in a worst-case scenario, several weeks or even months. The guide also advises that the "government agencies may not be able to react as quickly as you think they should." 6) The final localized storm surge risk reduction measures has been modified for the final report. There is now a limited number of raising of structures in the Parish. The St. James Parish Hospital would be included in the localized storm surge risk reduction system where Hwy 3125 will be used as localized storm surge risk reduction feature. 7) Evacuation plans by locals should be enacted well before the occurrence of storm surges into an area. Conflicts between flooded roadways and evacuation plans should not occur. Flooded roadways can impact egress back into developed areas, but these impact will be limited to a few hours or days. The portion of I-10 that flooded during hurricane Isaac will be addressed by the recommended plan. Only a portion of the Hwy 61 flooded for Isaac.
PC_9-23-2014_3_Richard St Pierre	Electrical Substations 1) Are plans being made to protect the substations that feed power to the residents in St. James Parish?	The modified localized storm surge risk reduction measures will address some the infrastructure impacts from storm events. The placement of flapgates along the highway will provide protection for facilities located between it and the Mississippi River levee.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-23-2015_4_Richard St Pierre	Economic LossesHave the following been included in your estimates?1) Cost of a refinery shutdown on gasoline prices (contact the American Petroleum Institute for help on this one). Motiva in Convent can also provide assistance.2) Cost of chemical plant shutdowns in St. James Parish.3) Impact on sugar prices if sugar crops in St. James Parish are ruined due to flooding.4) Lost wages for employees who cannot go to work due to flooding (and lost tax revenue to the government; employees and businesses)5} Elevated homes will still lose their landscaping if plants/shrubs remain under water for days. Floating debris (e.g., mulch) will plug drainage systems extending the flood period and causing the local governments to spend money to clean them out.	The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes are expected to be substantially the same whether or not the recommended plan is in place.It is possible that any of the alternatives considered can change the average number of days that industrial facilities are shut down. These benefits are expected to be small compared to benefits associated with flood damages avoided for physical property.The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes on a national basis are expected to be substantially the same whether or not the recommended plan is in place.The effect of lost production represents potential benefits for an alternative if it can be shown that the production cannot be made up at a later point in time or that it cannot be made up by another provider at another location. No change in the potential permanent lost production, as associated wages, are expected under the alternatives considered.The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes are expected to be substantially the same whether or not the recommended plan is in place.It is possible that any of the alternatives considered can change the average number of days that industrial facilities are shut down. These benefits are expected to be small compared to benefits associated with flood damages avoided for physical property.The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes on a national basis are expected to be substantially the same whether or not the recommended plan is in place.The effect of lost production represents potential benefits for an alternative if it can be shown that the production cannot be made up at a later point in time or that it cannot be made up by another provider at another location. No change in the potential permanent lost production, as associated wages, are expected under the alternatives considered.The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes are expected to be substantially the same whether or not the recommended plan is in place.It is possible that any of the alternatives considered can change the average number of days that industrial facilities are shut down. These benefits are expected to be small compared to benefits associated with flood damages avoided for physical property.The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes on a national basis are expected to be substantially the same whether or not the recommended plan is in place.The effect of lost production represents potential benefits for an alternative if it can be shown that the production cannot be made up at a later point in time or that it cannot be made up by another provider at another location. No change in the potential permanent lost production, as associated wages, are expected under the alternatives considered.
PC_9-25-2013_1_Jordan Baily	I live in Paulina, LA. We flooded bad during Isaac. If we are not protected by levees our town will be gone forever. I am willing to do anything it takes to save our community. Please take this into consideration.	Comment Acknowledged, thanks for your comment.
PC_9-25-2013_2_Tiffany Bourgeois	It is obvious what will happen in St. James Parish if Alternate C is the choice made by the US army corps of engineers. I will NOT flood because of Mother Nature but I WILL flood because of the decision made by the US army corp. of engineers. Encloseds are several photos but the one shown of Paulina is my neighborhood days after Isaac. This was a result of back water!	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-26-2013_1_Sheila Roussel	Supports Plan D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-26-2013_2_Edward Guidry	This meeting was a joke and a slap in the face for the residence of St. James Parish. It was a shut us up meeting. It takes no high price educated engineer and a many million dollar study to figure out when you build levies around the low ling areas like New Orleans, St. Charles, and St. John parishes someone else becomes the low ling area. This is surly about the number of votes for the usual corrupt politicians. I guess St. Tammany will get levies next you think you can run but you can't hide. You may get away with it in this life but in the next life you will answer to what you did and also what you did not do.	Comment Acknowledged, thanks for your comment.
PC_9-26-2013_4_Sheila Roussel	I understand the corp of engineers have tentatively chosen plan C but what I don't understand is how or why. It seems very obvious that if they proceed with the tentatively chosen plan C, they are creating a flood zone for St. James Parish. We are strongly requesting you reconsider and choose plan D. This is the most logical plan that provides protection to all of the parishes.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-29-2013_1_Brendon Ruiz	As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. ArmyCorps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D.According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-29-2013_2_Joel Borne	As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_9-29-2013_3_Marilyn Duhon	we do not need to have water dumped into our parish. Please reconsider using alignment D as this is the only way we can be protected from the water.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_9-30-2013_1_Jessica Ruiz	As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-3-2013_10_Sunny Brady	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-3-2013_11_Mr and Mrs Gerald Bourgeois JR	I am asking for your assistance to promote the option of Alignment D for the West Lake Ponchartrain Hurricane Levee Protection. If we do not overturn the decision that has already been made, St. James will be the next parish to flood out during a hurricane. Do not let what happened to St. John Parish last year during Hurricane Isaac happen to the resident of St. James Parish. We fought a long 72 hours in St. James Parish sand bagging homes of our neighbors so we would not be in the same situation as our neighbors in St. John the Baptist Parish.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-3-2013_6_Susan Roussel Poirrier	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-3-2013_7_Wendy Kliebert	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_9-3-2013_8_Michael Weber	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-3-2013_9_Joan Weber	I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_9-4-2013_1_Thomas Thompson	I hereby respectfully request that the attached letter and report "Why There Is No Storm Surge Protection For The Lake Pontchartrain Basin" be made a part of and included in the comments to The U.S. Army Corps of Engineers' West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study Integrated Feasibility Report and Environmental Impact Statement.	Comment Acknowledged, thanks for your comment.
PC_9-7-2013_1_Melody Deroche	As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
SD_10-02-2013_1_John A Johnny Berthelot	Is Ascension Parish included in the Federal Authorization? If so, what is then me of the bill? If not, do they need to be included, and how will being included affect the choice of alignments?	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authority allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events. . Existing damages in Acsension Parish were reviewed and determined that the dominant causes of damage are not from coastal storms or ocean tidal action, but from rainfall events.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
SD_10-02-2013_1_John A Johnny Berthelot	Is it true that for Alignment D that the costs of constructing the levee are counted, but not the benefits?	The use of screening based on cost was appropriate, due to the fact that both the non-structural features associated with A&C and the level of risk reduction assumed for D were at the same level. The benefits for the non-structural features associated with A&C were actual understated. If a detailed evaluation was conducted on of the raising of homes they would actual obtained a higher level of risk reduction due to the fact that they would address damages from rainfall events associated with storm. Also Alternative D would still include residual risk due to potential failure events.
SD_10-02-2013_1_John A Johnny Berthelot	Is it true that for Alignment D that there are no benefits calculated for the protection that would be provided to 1-10? If not, why?	Impacts to I-10 were investigated in the study process but in the review of the sections of I-10 in St. James Parish showed that when factoring in the probability of flooding (when and how often does flooding occur in a particular location) and consequences (potential damages associated with flooding), there is limited NED benefits to be gained. Flooding of large segments of I-10 does occur, but not until later in the study period. Even with flooding of the roadway, the impacts would only be temporary impacts. Large NED benefits related to roadway flooding are only typically gained when roadways are washed out and impacts such as road closures are long lasting. The loss of the I-10 twin spans after Katrina is an example of this scenario. The nature of the flooding in the future is not consistent with this condition. The inclusion of the potential transportation impacts in the report were included to show that there could be impact but they may not be related to a NED impact.
SD_10-02-2013_1_John A Johnny Berthelot	What is the true risk of flooding for Ascension and St. James Parish with no project? How many structures will flood? To what level? Where?	Please see Chapter 2 of the final report. It provides the level of flooding throughout the study areas. Additional detail can also be found in the engineering appendix of the final report.
SD_10-02-2013_1_John A Johnny Berthelot	What are the adverse impacts to Ascension and St. James with Alignment C? How many structures will flood? To what level? Where?	In general, the potential impacts to communities outside of the proposed levee alignment would be similar with and without Alignment C. There is a margin of error in both the economic model and the storm surge modeling (ADCIRC) which is recognized by team hydrologists and economists. At feasibility level of design, the model uncertainty and inclusion of localized storm surge risk reduction measures adequately address the limited potential for induced damages. Additional ADCIRC modeling will be performed during preconstruction engineering and design to determine whether or not there will be induced flooding and to precisely estimate its magnitude. Please see Chapter 3 of the final report for additional details.
SD_10-02-2013_1_John A Johnny Berthelot	Is it true that that the construction cost difference between Alignment C ($88 M) and Alignment D ($890M) is only $10M? It seems that there would be several LARGE structures that woul be required to be constructed (Blind River Crossing and Bayou Conway Crossing) for Align D, so how is it that here is only $10M cost difference?	Cost for a structure at Blind River was included with Alignment D. The cost for the structure was similar to other structures in SE Louisiana.
SD_10-02-2013_1_John A Johnny Berthelot	The environmental impacts are substantial for any alignment, but the environment is already significantly impacted by the footprint and restriction of natural water movement by 1-10. How can a levee that parallels 110 have that much worse of an impact?	Impacts from the I-10 were incorporated in the WVA. Although large section of I-10 are not elevated there are still large areas that allow flows under the highway. Areas near Reserve Canal, MS. Bayou, Hope Canal, Blind River, Conway and a few culverts under I-10 allow flow under the highway
SD_10-02-2013_1_John A Johnny Berthelot	Is there to be a structure buy-out and elevation program in St. James and Ascension? How is it determined which structures/areas will be elevated and which will be bought-out? Has the location and number of structures been determined?	The localized storm surge risk reduction measures have been modified for the final report. There are now a limited number of raising of structures in the Parish.
SD_9-17-2013_4_Gregory A Miller	Among many things that the draft report failed to consider in recommending Alternative C are: I . Post-2007 events such as the flooding from Hurricane Isaa in 2012; 2. The post-construction effects of an Alternative C alignment on our communities outside of the protected area; and 3. The resulting increased costs of non-structural measures in those communities outside the protected area.	The storm surge modeling was not based on historical storms, but statistical storm surge models. These models are verified using data collected from past storms such as Issac. The WSLP modeling data was verified using Issac data. The Localized storm surge risk reduction measures were modified for the final report.
SD_9-17-2013_4_Gregory A Miller	I fully support the locally preferred Alignment D alternative conta ned in the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study. This alignment would be in the best interest of Ascension Parish, St. James Parish, St. John the Baptist Parish and St. Charles Parish, and the entire region, including New Orleans	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
State_10-04-2013_1_Monica T. Salins	Economic benefits only looked at losses to residential and commercial structures. Therefore, benefits for Alternatives A & C are actually overstated and the benefits for Alternative D are understated-- thus misrepresenting the benefit to cost ratio. The report assumes exactly the same benefits for all alternatives.	The use of screening based on cost was appropriate, due to the fact that both the non-structural features associated with A&C and the level of risk reduction assumed for D were at the same level. The benefits for the non-structural features associated with A&C were actual understated. If a detailed evaluation was conducted on of the raising of homes they would actual obtained a higher level of risk reduction due to the fact that they would address damages from rainfall events associated with storm. Also Alternative D would still include residual risk due to potential failure events.
State_10-04-2013_1_Monica T. Salins	The non-structural approach does not account for losses to vehicles, farm equipment, livestock, power sub stations, gas pumps, sewerage systems, potable water systems, and other physical items that will not be elevated, cannot be elevated, or able to be evacuated prior to a storm event.	The localized storm surge risk reduction measures have been modified for the final report. There are now a limited number of raising of structures in the Parish.
State_10-04-2013_1_Monica T. Salins	What about crops? A surge that recedes quickly might not cause any significant damage to any given crop, but what if water sits and recedes slowly - the crop could be lost. Also, undesired levels of salt could be permanently deposited on the land causing irreversible damage to crop land.	Agricultural losses were investigated but potential acres impacted were only identified through inundation maps, and land use maps. Studies in the past have captured benefits associated with damages to crops, but due to the nature of the crop this benefit category was not calculated and included in the NED category. The study area's major crop is sugarcane. Currently there is no empirical data to show that there are historical large scale losses of sugarcane crops in the study area. Damages to crops have to be evaluated through probabilistic method. With-out empirical data, determining flood losses associated with sugarcane is a complex determination due to the fact that is flooded sugarcane is not always total loss from storm surge flooding. If it cannot be used for sugar production, it could still be cut and reused as "seedcane". Cut flooded stalks or stalk sections, called billets, can be planted, and the stalk buds germinate and grow to produce the next crop. The use of flooded billets can help to off set the loss of sugar production vs. the cost for planting the next crop. The inclusion Perique tobacco as a crop damaged by storm surge was also investigated in the study process but there was limited empirical data to show that the crop is damaged by storm surges events. When factoring in the probability of flooding (when and how often does flooding occur in a particular location) and consequences (potential damages associated with flooding), there is limited risk for damages to Perique tobacco from storm surges, due to the fact the crop is grown outside of the hurricane season.
State_10-04-2013_1_Monica T. Salins	What if someone doesn't like the idea of moving or having their house raised – they don't get protection? What if the Corps decides their house isn't worth raising? Then what would happen? Are they forced to move?	The localized storm surge risk reduction measures have been modified for the final report. There are now a limited number of raising of structures in the Parish.
State_10-04-2013_1_Monica T. Salins	If the Operation and Maintenance (O&M) costs are 100% non-federal and the locals fully embrace the responsibility for these costs – why not do a "what-if" scenario of the alternatives with the O&M costs excluded and see how the benefit to cost ratios compare with just construction costs.	Per the Water Resources Planning Act of 1965 (Pub. L. 8980) and per the Economic and Environmental Principles and Guidelines for water and related land resources implementation studies, Chapter 2, OM&R costs for the alternative have to be included in the evaluation to maintain the benefit stream of the alternative.
State_10-04-2013_1_Monica T. Salins	as 50% local sponsor/owner of this study, I request that a "what-if" scenario be included and factored in the report for informative purposes to show how close Alternatives C and D actually are.	The first cost presented to the public were based on first cost, but the construction schedule between the two alternatives impacts the difference between construction costs and the total NED project costs. In this case the localized storm surge risk reduction costs are distributed over the 50 year period of analysis and applied only when the damages could occur. Due this the cost are heavily discounted for alternatives A and C compared to D which has large cost early in the period of analysis. The cost difference using the NED criteria is over $200M when including the heavily discounted cost with Alternative C. While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
State_10-04-2013_1_Monica T. Salins	Why are we being assessed mitigation costs against the project, when the report clearly indicates these wetlands will be lost by 2070 due to subsidence and sea level rise? Wouldn't you think that the protection levee would help protect the 79 square miles of wetlands? Where is the proof that the wetlands behind the levee will be lost by 2070; why doesn't the project get mitigation credits for saving 79 square miles of wetlands?	Please see Chapter 3 and the Environmental Appendix which includes the WVA analysis was conducted using habitat measurements and planning and habitat team assumptions. The team used this information to validate the assumptions used for the draft report. The FWOP conditions based on an AHUU value was compared to the FWP impacts to determine the final mitigation requirements. The final mitigation requirements reduced based on impacts that would have already been under the FWOP conditions. Impacts from the I-10 were incorporated in the WVA. Although large sections of I-10 are not elevated there are still large areas that allow flows under the highway. Areas near Reserve Canal, MS. Bayou, Hope Canal, Blind River, Conway and a few culverts under I-10 allow flow under the highway
State_10-04-2013_1_Monica T. Salins	On page 2-13, I strongly disagree that with no action there would be NO direct impact on community and regional growth.	The economic analysis shows that under the most likely future without-project condition there will be relatively small, but positive, development in the study area. Therefore, the impact of "no-action" is that there is no change in this projection.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
State_10-04-2013_1_Monica T. Salins	On page 3-12 it states that "…Alternative D poses potential uncertainties concerning impoundment of large areas of wetlands, especially if the river diversions are constructed. While it would prevent saltwater intrusion, it would risk impacting the hydrology by enclosing approximately 54,800 acres of swamp and would impact the EQ of the Maurepas WMA as well as Blind River…". Where is the evidence that the levees will damage the wetlands? I cannot find the answer within this report. It does not exist. It is the opinion of the environmental types	Please see Chapter 3 and the Environmental Appendix which includes the WVA analysis was conducted using habitat measurements and planning and habitat team assumptions. The team used this information to validate the assumptions used for the draft report. The FWOP conditions based on an AHUU value was compared to the FWP impacts to determine the final mitigation requirements. The final mitigation requirements reduced based on impacts that would have already been under the FWOP conditions.
State_10-04-2013_1_Monica T. Salins	There is reference to temporary interruption to service, inconveniences, and possible relocation of services elsewhere. I do not see where the costs associated with these impacts are accounted for in Alternative A and Alternative C. There are definitely costs associated with interruption in service – to both the service provider and the consumer.	The comment was taken into consideration for the final recommendation.The localized storm surge risk reduction measures have been modified for the final report. There are now a limited number of raising of structures in the Parish.
State_10-04-2013_1_Monica T. Salins	The Mississippi River Corridor between New Orleans and Baton Rouge is a major industrial and petro-chemical plant hub for the country. Products from these industries and plants are shipped via pipeline to all parts of the country. Alternative D provides the least impacts to these pipelines compared to Alternatives A and C, 14 pipeline crossings versus 36 versus 70, respectively. We have reviewed the pipeline relocation costs and feel these costs have not been fully evaluated. While the construction cost to relocate the pipelines was included per Engineering Appendix B, the pipeline outage cost and loss of material cost were not included. Those are significant dollar figures to leave out of this study.	The pipelines database was used on the formulation of plans. They were used as cost avoidance measure, and also included in the review of plans that met the objective of "reducing the risk of damage and loss of critical infrastructure". Impacts to pipelines were investigated in the study process but there was limited empirical data to show that there are storm damages to pipelines that are mostly buried. Impacts to pipeline facilities such as transfer stations that have if damageable assets were included the NED benefits.
State_10-04-2013_1_Monica T. Salins	PLD wants to know the incremental induced flooding impact to St. James and Ascension Parishes based upon Alternatives A and C and the cumulative induced flooding impacts to St. James and Ascension Parishes for the entire Lake Pontchartrain and Vicinity Program since the enactment after Hurricane Betsy.	Additional discussion was added to the final report. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .01-.02 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. In the case of Alignment D any induced stages on the existing non-Federal levee could not change the fragility of the existing levee. Any impacts would have to be mitigated for and the cost would be borne by that project. In most cases this would mean additional cost will be added to a project with no additional benefits. The federal project would still end at the tie-in point, after mitigating for any impacts. Investigating impacts from the Lake Pontchartrain and Vicinity Program is outside the WSLP study authority.
State_10-04-2013_1_Monica T. Salins	PLD does not feel the study has included enough benefits for the protection of the federal and state highway systems in Alternative D.	Impacts to I-10 were investigated in the study process but in the review of the sections of I-10 in St. James Parish showed that when factoring in the probability of flooding (when and how often does flooding occur in a particular location) and consequences (potential damages associated with flooding), there is limited NED benefits to be gained. Flooding of large segments of I-10 does occur, but not until later in the study period. Even with flooding of the roadway, the impacts would only be temporary impacts. Large NED benefits related to roadway flooding are only typically gained when roadways are washed out and impacts such as road closures are long lasting. The loss of the I-10 twin spans after Katrina is an example of this scenario. The nature of the flooding in the future is not consistent with this condition. The inclusion of the potential transportation impacts in the report were included to show that there could be impact but they may not be related to a NED impact. Although the Federal Highway Administration (FHWA) has approved computer models to calculate the amount and cost of delay, these delays have to be tied to long term NED impacts such long term housing cost due to the inability to access an area because of major roadway damage.
State_10-04-2013_1_Monica T. Salins	In Paragraph 1.3 of the study, there is discussion of the severe impacts of Hurricane Isaac on the Port of South Louisiana. I cannot find any reference in the calculation of benefits for the Port of South Louisiana in the document. Why were they excluded?	Impacts to these facilities were captured in the NED benefits if damageable assets (e.g. office buildings, warehouse, processing facilities) were impacted from storm surge. Shutdown losses related to high winds associated with tropical event are not captured in the NED benefits due to the fact that they would still occur without the recommended plan.
State_10-04-2013_1_Monica T. Salins	I could not find any impacts to industry in the document for either St. John the Baptist or St. James Parishes.	We requested available information at the public meeting, but none of the areas large facilities provided information. Impacts to these facilities were captured in the NED benefits if damageable assets (e.g. office buildings, warehouse, processing facilities) were impacted from storm surge. Shutdown losses related to high winds associated with tropical event are not captured in the NED benefits due to the fact that they would still occur without the recommended plan.
State_10-04-2013_1_Monica T. Salins	Based upon the damages to St. John the Baptist and St. James Parish during Hurricane Isaac, has the USACE compared actual losses versus the projected losses outlined in the study to determine the validity of benefit projections?	The impacts and highwater marks from Isaac were used to validate the model. The existing conditions in both the 100 yr modeled conditions were very similar to the Isaac event in some locations.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
State_10-04-2013_1_Monica T. Salins	Ascension Parish benefits have been completely ignored. PLD has been told by USACE Council that the parish could not be included since Ascension Parish was not in the authorized study area. When PLD contacted the Louisiana Congressional Delegation to include Ascension Parish in the study area, the New Orleans District requested we not change the study area because it would delay the study two years. Alternative D will provide structural protection to Ascension Parish yet benefits will not be accounted in the benefit to cost ratio but the costs have been included. This is another instance where a USACE regulation seems to run contrary to common sense.	Existing damages in Ascension Parish were reviewed and determined that the dominant causes of damage are not from coastal storms or ocean tidal action, but from rainfall events. Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authority allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events.
State_10-04-2013_1_Monica T. Salins	Please place these comments, observations, suggestions and questions into your report, and as 50% owner of this study, I trust that the answers to these questions and ALL of the questions submitted by ALL interested parties from the public meetings, email and U.S. Mail will be provided to this 50% owner, the Pontchartrain Levee District, within thirty (30) days after the close of comment period, on or before November 18, 2013	Final comments have been included in the final report
State_10-07-2013_1_Christopher P Knotts	It is definitely in DOTD's best interest to strongly encourage Alignment D as compared to the current recommendation from the Corps of selecting Alignment C.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
State_10-07-2013_1_Christopher P Knotts	The Report Study (surge model) seems to have not considered the rainfall intensity and duration. Hurricane Isaac's rainfall duration contributed to the flooding of I-10.	Addressing impacts from excessive rainfall events are not with study authority. Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authorization allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events.
State_10-07-2013_1_Christopher P Knotts	Sheet No. 8 of Appendix B - Engineering states that all the structures are designed based on a 10-year, 24 hour rainfall. If any of these structures are considered as cross drains, our policy for cross drain design is ADT based (50-year when ADT > 3000, and 25-year when ADT < 3000). The size of the drainage area also determines calculation method (NRCS or USGS).	Comment noted. The design of system's cross section was based on the existing cross section. The use of the pump station is only for storm surge events. Under rainfall events the system will be left open and match the existing FWOP drainage conditions.
State_10-07-2013_1_Christopher P Knotts	Existing drainage patterns must be maintained or addressed and improved with the construction of any levee.	The existing rainfall drainage patterns will be maintained. Addressing rainfall draining problems and making improvements is outside of the study authority. Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authorization allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events.
State_10-07-2013_1_Jimmy L Anthony	Hydrologic information being presented to the HET has been insufficient particularly with respect to flood gate and environmental structure design and operation plans. Information has been provided to the HET in a rapid manner with impractical review and comment deadlines. The cumulative impacts of structural protection to the productivity and sustainability of Maurepas Swamp, Lakes Maurepas and Pontchartrain, and Blind River are difficult to determine. Complicating the matter is the fact that only preliminary modeling efforts have been completed. Of particular concern is the high probability that flood gates and environmental structures will be closed with increased frequency and duration in the future for salinity control purposes, which strongly suggests increasing fisheries and wetland impacts over time. We suggest that these important design and operation uncertainties be resolved immediately so that reliable predictions of impacts can be determined. Additionally, environmental structures sizing should be contingent upon modeling and identified in the Draft EIS. Furthermore, with the levee in place, pumps and their operation will be significant in maintaining the health of the Maurepas Swamp WMA and Blind River, a Louisiana designated Natural and Scenic River.	Hydrologic connectivity would be maintained to the extent practicable through water control structures except during closure for hurricanes or tropical storms. When the system is closed, pumps would operate on average for 1.7 storms per year, which equates to a closure of structures on average 8.5 days per year. This expected rate of closure would be the same under a changing sea level rise conditions, due to the fact that the trigger for structure closures would be under tropical storm events and the elevation trigger would be adjusted as sea level rises. The recommendation only addresses hurricane and storm damages and the system would not close more often due to higher day-to-day sea level rise impacts. Any operational changes outside of the original project purpose; the reduction of damages caused by wind-generated and tide-generated waves and currents, would be considered a separate project purpose and authorization, and would require a new NEPA documentation and/or a permit approval for this operation change. Recent freshening trends in the lake make salinity intrusion less likely.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
State_10-07-2013_1_Jimmy L Anthony	Structure operation fisheries effects should include structure closure effects (timing and duration of closure and how this could change with time), open structure effects (changes in flow, concentrating/limiting migration corridors, and reduction in access), and how this could alter local population dynamics of aquatic species at all life stages. The Draft EIS may not have adequately addressed if and how aquatic species will be affected.	Closure of structures on average 8.5 days per year would have minimal impact on fisheries recruitment.
State_10-07-2013_1_Jimmy L Anthony	Throughout the process, it has been mentioned that other local, state, and federal wetland restoration projects in the area will reduce the impacts of salt water intrusion, and that the levee itself is a form of wetland restoration. The potential benefit that a levee would have on wetland habitat would be preventing wetland loss on the inside through erosion and scour during storm surge events. However,these sporadic storm event benefits might be contradicted by long-term wetland degradation resulting from levee hydrologic interference. It would be more appropriate to discuss the other local, state, andfederal wetland restoration projects (i.e., Convent to Blind River, Hope Canal Diversions, etc.), their interaction with the levee, and ecosystem response in a separate section; and to clarify that theserestoration projects are not part of the levee plan, although they should be incorporated. Provided that restoration projects include freshwater introductions, how these projects would influence structureoperation (closure time and duration) should be considered. Given that these state/federal coastal restoration projects are recommended as restoration for the Maurepas Swamp, we believe these restoration projects deserve more discussion in the Draft EIS. These separate local, state, and federal restoration projects are better suited to address the described coastal land loss issues than leveeconstruction, where as with levee construction the primary goal is infrastructure protection. We also recommend further detailed discussion on how the presence of a levee could negatively impact theeffectiveness of these restoration projects inside and outside of the levee (un-natural hydrologic/marsh flooding regimes, formation of stagnant/low circulation areas, high flow areasaround structures increasing erosion rates, etc).	Recent freshening trends in the lake make salinity intrusion less likely.
State_10-07-2013_1_Jimmy L Anthony	Page 3-12. Alternative D: Page 4-22. Alternative D.· Page 6-4. Section 6.16 Wild and Scenic River Act of 1968 (Rivers). Blind River is a "Natural and Scenic River," not a "Wild and Scenic River." The legislation that established the Natural and Scenic Rivers System is referred to as the "Louisiana Scenic Rivers Act" (R.S. 56: 1840-1856) not the "Wild and Scenic River Act."	Comment noted. A clarification has been made in the final report.
State_10-07-2013_1_Jimmy L Anthony	Pages 4-15 and 4-17. Multiple Sections. "However, preliminary hydrologic modeling indicates that the project design would have minimal changes to flows or stages on either the protected or unprotected sides. " This part of the document needs clarification on affects both inside and outside the system, including detailed information on how the water moves in and out of the system and locations of all rivers, bayous, streams, etc. that would be impaired. Providing a visual aid in the document may assist in planning and analysis. We would recommend such a statement be removed until further detailed analysis and modeling can be done and agreed upon by the HET.	A flood side ditch and a protected side canal would parallel the entire levee length. The canals would be used to maintain the existing connection between swamps inside and the swamps outside the levee system.
State_10-07-2013_1_Jimmy L Anthony	Page 4-18. Section 4.3.5 Essential Fish Habitat, Alternative C. "Closure of the levee system during hurricane/tropical storm surge events would reduce minor salt water intrusion into wetland habitats in the proposed levee system. This could provide some reduction of the potential ecological stresses associated with saltwater intrusion and could also help reduce the conversion of existing forested wetlands and swamps to marsh and open water habitats (EFH). " Similarly, diversions could reduce salt water intrusion. Clarification is needed here to give rise to an understanding that the sole purpose of the levee is to protect life and property not to prevent salt water intrusion into wetlands; the claim that the levee system protects the wetlands is somewhat debatable. We caution making assumptions that the levee would ease wetland loss, while although there are signs of degradation, proven restoration techniques would benefit the system naturally and still maintain the storm surge buffer. It is stated in the Draft EIS that hydrologic and fisheries impacts will be minimal because salinity modeling shows little change. Salinity models do not take into account major hydrologic and ecological characteristics such as marsh flooding frequency, increasing flow velocities, and aquatic organism access reductions that can have substantial impacts on wetland and fisheries productivity and would differ inside and outside of the proposed levee. Furthermore, discussions in this section and others may be warranted regarding potential changes in velocities as a result of gates and/or environmental structures and its effects on aquatic species passage.	There is no EFH inside the levee alignment. Closure of the levee would not have any cumulative impact.
State_10-07-2013_1_Jimmy L Anthony	Economics. Appendix D. Discussion, in this section or another, may be warranted regarding potential loss of recreational and commercial hunting, fishing, and boating opportunities and associated economic impacts as result of the proposed levee construction. This issue does not appear to be adequately addressed in the Draft EJS, especially with respect to frequency of closures. Also, the document did not seem to address navigation impacts and the possibility of boats being trapped outside the system during storm events, subsequent closures and those economic impacts.	Section 4.1.2 acknowledges that “Proposed structural measures would cause the Cajun Pride Swamp Tours temporary loss of access to the adjacent waterway until construction of boat access to the waterway is restored following construction of this reach of the project.”

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
State_10-07-2013_1_Jimmy L Anthony	In the past year LDWF estimates that there were 22,673 Maurepas Swamp WMA users. Many of these users utilize small waterways to access the WMA. There are also private in holdings and these owners rely on water access. If water control structures are only provided at Blind River, Mississippi Bayou and Reserve, Hope and Conway canals, user access will certainly be disrupted. The loss of recreational access areas on and to the WMA, including Hope Canal Road, Hope Canal boat launch, and Reserve Canal launch, should be avoided, as access is already a limiting factor on the WMA. If impacts to these important public access areas are not avoidable, alternative public access (i.e., roads and launches) should be planned for. Alternative access shall be determined only after close coordination with LDWF and other stakeholders, and shall be incorporated into the project design.	Please see the details of the final design recommendation. Impacts to the WMA or other users be avoided, minimized or mitigated for.
State_10-07-2013_1_Jimmy L Anthony	Cross-Sections that have been provided to LDWF from other applicants depict Blind River, from top bank to top-bank, to be approximately 300 feet wide at 1- 10. LDWF is concerned that the proposed 40-foot wide, 20-foot deep structure is inadequate to maintain current stream flow patterns without adversely affecting hydrology (i.e., tidal flows, periodic/seasonal high flows, and depth, duration and frequency of floodplain flooding). Should Alternative D be selected, detailed analysis/modeling would need to be provided that demonstrates that the existing shoreline of Blind River is not altered by levee and gate construction. Reservoir construction is prohibited by the Louisiana Scenic Rivers Act (R.S. 56: 1853). Reservoir construction is defined in the Act as "any permanent dam or impoundment which alters the shoreline of a natural and scenic river" (R.S. 56: 1842).	Alignment D is not in the recommended plan. It would be inappropriate to speculate about details of a scenario that is not recommended.
State_10-07-2013_1_Jimmy L Anthony	The proposed levee project will result in the direct loss of forested wetlands within the Maurepas Swamp. Currently, elimination of nutrient and freshwater inputs threatens the sustainability of these forested wetland systems. LDWF believes that the most effective strategy to restore health and productivity of the Maurepas Swamp is construction of Mississippi River reintroductions into the Swamp. However, additional measures such as eliminating barriers to surface flow patterns are also needed, not only to compliment the planned river reintroductions, but also to improve current hydrologic conditions. Therefore, LDWF recommends that mitigation measures aim to enhance or improve surface hydrology, such as gapping and degrading spoil banks and other artificial impediments to sheet flow. Also, collecting available wastewater and/or storm water from surrounding communities and distributing it through the swamp could be an additional mitigation measure.	During the development of the mitigation plan both Alternative 33 and 37 of the LCA Amite project were looked at in coordination with USFWS and staff at the Maurepas WMA. It was determine that Alternative 33 is being done by the State and the hydraulic modification portion of Alt 37 was being done by Livingston Parish. At this time no other hydraulic modification projects could be found that would produce the appropriate amount of AAHUs. In the future if projects come to light they could be considered
State_10-07-2013_1_Jimmy L Anthony	In order to be considered adequate, the compensatory mitigation must reflect on short and long-term direct and indirect impacts to wetland and fisheries production, which at this time is not present in the Draft EIS. Any mitigation plan should include long-term monitoring and be adaptive in nature to account for unforeseen future impacts. Furthermore, mitigation should be financially assured and proposed to be concurrent with levee construction. It's recommended to also include a long-term fisheries monitoring plan to determine if substantial fisheries impacts are occurring from levee construction and once completed, floodgate and environmental structure operation. We look forward to continued work with USACE and resource agencies to insure that adequate and appropriate mitigation is determined and a plan included in the final EIS.	Potential project-induced impacts of the Recommended Plan to wetlands and other resources have been quantified by the Wetland Value Assessment (WVA) methodology during the Feasibility-Level Analysis phase. Findings from the WVA analysis were utilized to determine compensatory mitigation which would compensate for unavoidable project-induced impacts. A mitigation plan (Appendix A Annex K) has been developed in coordination with resource agencies. Mitigation benefits were also assessed utilizing WVA methodology. The mitigation plan will include the 12 “items” required to demonstrate compliance with 33 CFR 332.4(c) including: objectives, site protection instrument, baseline information, work plan, maintenance plan, performance standards, monitoring requirements, financial assurances, site selection factors, credit determination, long-term management plan and adaptive management plan. Any monitoring or adaptive management activities in the wetlands on the protected side of the levee would exceed the project purpose and would fall outside of the authorization.
State_10-07-2013_1_Jimmy L Anthony	Our LNHP database indicates the presence of bird nesting colonies within one mile of the western end of Alignment D. Please be aware that entry into or disturbance of active breeding colonies is prohibited by LDWF. In addition, LDWF prohibits work within a certain radius of an active nesting colony. Nesting colonies can move from year to year and no current information is available on the status of these colonies. If work for the proposed project will commence during the nesting season, conduct a field visit to the worksite to look for evidence of nesting colonies. This field visit should take place no more than two weeks before the project begins. If no nesting colonies are found within 400 meters of the proposed project, no further consultation with LDWF will be necessary. If active nesting colonies are found within the previously stated distances of the proposed project, further consultation with LDWF will be required. To minimize disturbance to colonial nesting birds, the following restrictions on activity should be observed: • For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, roseate spoonbills, anhingas, and/or cormorants), all project activity occurring within 300 meters of an active nesting colony should be restricted to the non-nesting period (i.e., September 1 through February 15). • For colonies containing nesting gulls, terns, and/or black skimmers, all project activity occurring within 400 meters of an active nesting colony should be restricted to the non-nesting period (i.e.,September 16 through April 1).	Alignment D is not in the recommended plan. Impacts are described in chapter 5 for the update of Alternative C, the localized storm surge risk reduction measures and mitigation areas.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
State_10-07-2013_1_Jimmy L Anthony	Finally, the Department understands that work thus far has been preliminary; however, we have concerns that some aspects of ecological impacts will be overlooked with the implementation of "Smart Planning." Additionally, we understand that there has been local support for Alignment D. While we understand why there is local support for Alignment D, as a resource agency we support the Tentatively Selected Plan (i.e., Alignment C) because it is one of the least environmentally damaging alignments. However, by limiting selection to only three alternatives, opportunity to further reduce impacts is lost. For example, Alignment D is purported to provide protection to 1-10. However, elevating more sections ofl-1 0 would also provide a secure evacuation route. Another example would be construction of ring levees around the communities located outside of Alignments A and C or extending levee Alignments A and C westward along U.S. Hwy 61 to encircle additional communities such as Lutcher and Gramercy. These types of alternatives could assist with avoiding impacts to the Maurepas Swamp and Blind River which play an important role in the livelihood of many recreational and commercial users while at the same time extending levee protection to other communities.	Alignments C-la and C-lb were review as part of the study process but they were not included because the alternatives would have similar benefits and cost as Alignment D. Also, the indirect impacts maybe limited with these Alignments but the direct impact were estimated to be greater due to the fact that the total length of the alignment is greater than D.
State_10-14-2013_2_Senator Gary Smith	Fully Supports PLD position	Comment Acknowledged, thanks for your comment.
State_10-25-2013_1_CPRA	The report states that Alternative D is estimated to enclose more wetland acres (56,228 acres) than Alternative C (8,424 acres) and therefore assumes greater negative impacts to wetlands. However, the report does not identify what the indirect negative environmental impacts will be to the wetlands and how those impacts may be calculated. The report appears to apply differing standards to wetlands under Alternative C than when considering Alternative D. Specifically, the report documents that Alternative C "would provide for the protection of protected side wetlands, potentially extending their lifespan and their water quality functions." However, the potential added value of protecting more wetland acreage is not disclosed for Alternative D. The report should clearly describe the methodology used to assess levee impacts and benefits to wetlands and be consistent in that methodology for each proposed alignment.	The Final Report provides an additional screening (section 3.9.3) based feasibility level WVA analysis. The conclusion of that analysis: Alternative D has the greatest habitat impacts (approximately 2,080 AAHUs more than Alternative C), highest mitigation costs, the lowest BC ration, and lowest net benefits. Alternatives A and C are comparable in total impacts, with Alternative A having a total impact of approximately 151 AAHUs less. Alternative C has less direct impact, while Alternative A has fewer indirect impacts. Both Alternative A and C are considered environmentally acceptable alternatives, and provide benefits to the same number of structures.
State_10-25-2013_1_CPRA	Although the report provides an outline of the area receiving non-structural measures as part of Alternative C, the report should include a detailed list of businesses and residences being elevated and the associated costs for each. Businesses such as Co Ionia] Sugar, Rain Cll, Noranda Alumina, Petrologistics, Nalco, Nucor, OxyChem, Methanex Shell Geismar, Shell Convent, and Impala, to name a few, do not appear to be included in the non-structural measures component of Alternative C. The report should document why such businesses are not included if that is the case and how the economic and disruption consequences of such exclusions are quantified. The report should also include an induced flooding analysis to document how the non-structural measures area was derived and what the impacts will be to all areas not included in the non-structural measures as part of Alternative C.	The localized storm surge risk reduction measures have been modified for the final report. There are now a limited number of raising of structures in the Parish. Additional discussion was added to the final report related to induced flooding potential. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .01-.02 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed.
State_10-25-2013_1_CPRA	As noted in comments submitted by the Louisiana Department of Transportation and Development, the lack of hurricane and storm damage risk reduction for US-61 and portions of 1-10 are significant. As witnessed during recent hurricanes, these roads are major hurricane evacuation and recovery routes for south Louisiana. The report should consider the economic impacts to commerce in Louisiana and the Nation if such routes are flooded with Alternative C, as seen during Hurricane Isaac. The report should also consider the incremental economic difference in emergency response and recovery costs if such routes are flooded (i.e. flying versus driving).	Impacts to highways were investigated in the study process but in the review of the sections of I-10 in St. James Parish showed that when factoring in the probability of flooding (when and how often does flooding occur in a particular location) and consequences (potential damages associated with flooding), there is limited NED benefits to be gained. Flooding of large segments of I-10 does occur, but not until later in the study period. Even with flooding of the roadway, the impacts would only be temporary impacts. Large NED benefits related to roadway flooding are only typically gained when roadways are washed out and impacts such as road closures are long lasting. The loss of the I-10 twin spans after Katrina is an example of this scenario. The nature of the flooding in the study area is not consistent with this condition. The inclusion of the potential transportation impacts in the report were included to show that there could be impact but they may not be related to a NED impact.
State_10-25-2013_1_CPRA	The final report should fully document the deterioration of culture and of community cohesion due to Alternative C with respect to elevating some residences, businesses, and public facilities but not others and how this alternative would affect future population projections, employment opportunities and economic activity. The report should also document the negative impacts to communities due to ingress and egress limitations that would be exacerbated with Alternative C.	The localized storm surge risk reduction measures have been modified for the final report. There are now a limited number of raising of structures in the Parish.
State_10-25-2013_1_CPRA	The report should disclose the quantification of economic impacts to Louisiana and the Nation of Alternative C to business and industry shut-downs due to induced flooding of these businesses and induced flooding of secondary roads resulting in staffing deficiencies as compared to Alternative D. An induced flooding evaluation for the entire four parish project area should be included in the report to document water levels and water flows under Alternatives C and D so that economic impacts can be properly evaluated prior to the selection of a TSP.	Alignment D is not in the recommended plan. It would be inappropriate to speculate about details of a scenario that is not recommended. Additional discussion was added to the final report related to induced flooding potential. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .01-.02 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
State_10-25-2013_1_CPRA	Finally, Appendix A, Table 2 and Section 3.4 of the report should include the U.S. Fish and Wildlife Service (USFWS) alternatives as proposed in its October 9, 2012 letter and describe why those alternatives were screened out. In addition, any information available to date for the USFWS alternatives with respect to costs, benefits, and impacts should be included in the report to further document why those alternatives were not considered for further analysis.	Alignments C-la and C-lb were review as part of the study process but they were not included because the alternatives would have similar benefits and cost as Alignment D. Also, the indirect impacts maybe limited with these Alignments but the direct impact were estimated to be greater due to the fact that the total length of the alignment is greater than D.
State_10-25-2013_1_CPRA	Accordingly, we request that the USACE include documentation of benefits and impacts in the report for alternatives proposed to the west of Alternative C (e.g., the USFWS proposed Alignment C-la and C-tb, as noted in St. James Parish's October 2, 2013 correspondence) that provide similar levels of protection as Alternative D. Based on the information provided by stakeholders and comments received during the public meetings, we also request a reevaluation of the cost-benefit ratios calculated for Alternatives C, D, C-Ia, and C-1 b.	Alignments C-la and C-lb were review as part of the study process but they were not included because the alternatives would have similar benefits and cost as Alignment D. Also, the indirect impacts maybe limited with these Alignments but the direct impact were estimated to be greater due to the fact that the total length of the alignment is greater than D.
State_7-26-2013_5_Cleve Hardman	I am in receipt of your draft environmental impact statement (EIS) for the West Shore-Lake Pontchartrain Hurricane and Storm Damage Risk Reduction. The Division of Outdoor Recreation administers the Land and Water Conservation Fund (LWCF) for Louisiana. Our staff has identified seven LWCF-assisted sites within the project study area, one in St. John the Baptist Parish, six in St. James Parish and none in St. Charles Parish. Those sites are identified in the enclosed document along with GPS coordinates of each site. Our review of the draft EIS indicates none of the existing LWCF-assisted sites within the project study area would be impacted by any of the alternative plans. Indeed these sites are currently at risk unless action is undertaken to address the risk of hurricane and storm damage in this region. We stand ready to assist in any means possible toward realization of these efforts.	USACE appreciates the review of this document.
TOWN_10-3-2013_1_Town of Lutcher	A resolution requesting that the u. S. Corps of engineers reconsider their recommendation for the west shore Lake Ponchartrain hurricane protection levee and choose alternative D	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
TOWN_9-18-2013_1_Terry Borne	The Town of Gramercy, Louisiana, St. James Parish has reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the Corps of engineers to evaluate the different alignment options. Although Alignment Cis tentatively chosen, the Board of Aldermen and Mayor of the Town of Gramercy are requesting assistance to promote the option of Alignment D. The State of Louisiana Master Plan also shows Alignment D as the preferred plan. Alignment D is the only option that will provide levee protection to Gramercy and St. James Parish. The overturn of this decision is important to insure the safety of families, properties, and/or businesses during the event of a hurrican or tropical storm. Gramercy sustained flooding of a number of homes during Hurricane Isaac and should Alignment C be chosen, will create even greater flooding to our community. It is critical that members of our community, as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance you can provide will be greatly appreciated.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_09-17-2013_1_V.J. St Pierre	Supports the selection of Alt D, instead of C. $10M difference in cost is minor.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_09-17-2013_2_V.J. St Pierre	Wetland acreage is a concern, but wetlands would be protected from saltwater intrusion.	Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area. In addition with the closure of the MRGO there has been a freshening trend on the west side of Lake Pontchartrain.
PC_09-17-2013_3_V.J. St Pierre	Important to build the projects quickly to help avoid impacts from BW12.	Concur
PC_09-17-2013_4_V.J. St Pierre	Recommends a phased approach - with St John and St Charles protected, while part 2 under review. Would allow protection to be built while review is ongoing.	Comment noted – Congressional Authorization would be needed for phased approach.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-17-2013_5_Kurt Roussel	Concern about impact of benefit from St John will result in impacts to St James	As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_09-17-2013_6_Kurt Roussel	Asserts that St John needs the levee	The localized storm surge risk reduction measures have been modified for the final report. The berms in the recommendation would provide additional risk reduction to infrastructure in St. James Parish, compared the TSP
PC_09-17-2013_7_Kurt Roussel	Does emergency benefit category include benefits to keeping Waterford 3 online, as part of the Federal Emergency Response Plan for Waterford 3?	As discussed in Chapter 3 of the main report and the planning appendix, the updated localized storm surge risk reduction measures will address these concerns.
PC_09-17-2013_8_Kurt Roussel	Does benefit calculations include the effect of Motiva Convent refinery shutdown?	The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes are expected to be substantially the same whether or not the recommended plan is in place. It is possible that any of the alternatives considered can change the average number of days that industrial facilities are shut down. These benefits are expected to be small compared to benefits associated with flood damages avoided for physical property. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes on a national basis are expected to be substantially the same whether or not the recommended plan is in place. The effect of lost production represents potential benefits for an alternative if it can be shown that the production cannot be made up at a later point in time or that it cannot be made up by another provider at another location. No change in the potential permanent lost production, as associated wages, are expected under the alternatives considered. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes are expected to be substantially the same whether or not the recommended plan is in place. It is possible that any of the alternatives considered can change the average number of days that industrial facilities are shut down. These benefits are expected to be small compared to benefits associated with flood damages avoided for physical property. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes on a national basis are expected to be substantially the same whether or not the recommended plan is in place. The effect of lost production represents potential benefits for an alternative if it can be shown that the production cannot be made up at a later point in time or that it cannot be made up by another provider at another location. No change in the potential permanent lost production, as associated wages, are expected under the alternatives considered. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes are expected to be substantially the same whether or not the recommended plan is in place. It is possible that any of the alternatives considered can change the average number of days that industrial facilities are shut down. These benefits are expected to be small compared to benefits associated with flood damages avoided for physical property. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes on a national basis are expected to be substantially the same whether or not the recommended plan is in place. The effect of lost production represents potential benefits for an alternative if it can be shown that the production cannot be made up at a later point in time or that it cannot be made up by another provider at another location. No change in the potential permanent lost production, as associated wages, are expected under the alternatives considered.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-17-2013_9_Kurt Roussel	Does benefit calculations include the safety to chemical industry from avoidance of a shutdown?	The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes are expected to be substantially the same whether or not the recommended plan is in place. It is possible that any of the alternatives considered can change the average number of days that industrial facilities are shut down. These benefits are expected to be small compared to benefits associated with flood damages avoided for physical property. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes on a national basis are expected to be substantially the same whether or not the recommended plan is in place. The effect of lost production represents potential benefits for an alternative if it can be shown that the production cannot be made up at a later point in time or that it cannot be made up by another provider at another location. No change in the potential permanent lost production, as associated wages, are expected under the alternatives considered. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes are expected to be substantially the same whether or not the recommended plan is in place. It is possible that any of the alternatives considered can change the average number of days that industrial facilities are shut down. These benefits are expected to be small compared to benefits associated with flood damages avoided for physical property. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes on a national basis are expected to be substantially the same whether or not the recommended plan is in place. The effect of lost production represents potential benefits for an alternative if it can be shown that the production cannot be made up at a later point in time or that it cannot be made up by another provider at another location. No change in the potential permanent lost production, as associated wages, are expected under the alternatives considered. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes are expected to be substantially the same whether or not the recommended plan is in place. It is possible that any of the alternatives considered can change the average number of days that industrial facilities are shut down. These benefits are expected to be small compared to benefits associated with flood damages avoided for physical property. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes on a national basis are expected to be substantially the same whether or not the recommended plan is in place. The effect of lost production represents potential benefits for an alternative if it can be shown that the production cannot be made up at a later point in time or that it cannot be made up by another provider at another location. No change in the potential permanent lost production, as associated wages, are expected under the alternatives considered.
PC_09-17-2013_10_Gregory Miller	Concerned that AltC does not protect ALL communities; leaves out significant parts of Ascension. Ask to recommend Alt D, for only 10M more.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-17-2013_11_Gregory Miller	Economic national security of petrochemical industry vulnerable	The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes are expected to be substantially the same whether or not the recommended plan is in place. It is possible that any of the alternatives considered can change the average number of days that industrial facilities are shut down. These benefits are expected to be small compared to benefits associated with flood damages avoided for physical property. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes on a national basis are expected to be substantially the same whether or not the recommended plan is in place. The effect of lost production represents potential benefits for an alternative if it can be shown that the production cannot be made up at a later point in time or that it cannot be made up by another provider at another location. No change in the potential permanent lost production, as associated wages, are expected under the alternatives considered. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes are expected to be substantially the same whether or not the recommended plan is in place. It is possible that any of the alternatives considered can change the average number of days that industrial facilities are shut down. These benefits are expected to be small compared to benefits associated with flood damages avoided for physical property. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes on a national basis are expected to be substantially the same whether or not the recommended plan is in place. The effect of lost production represents potential benefits for an alternative if it can be shown that the production cannot be made up at a later point in time or that it cannot be made up by another provider at another location. No change in the potential permanent lost production, as associated wages, are expected under the alternatives considered. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes are expected to be substantially the same whether or not the recommended plan is in place. It is possible that any of the alternatives considered can change the average number of days that industrial facilities are shut down. These benefits are expected to be small compared to benefits associated with flood damages avoided for physical property. The price changes in products is a regional economic effect that is not included in the estimate of national economic development benefits. Also, storm-related price changes on a national basis are expected to be substantially the same whether or not the recommended plan is in place. The effect of lost production represents potential benefits for an alternative if it can be shown that the production cannot be made up at a later point in time or that it cannot be made up by another provider at another location. No change in the potential permanent lost production, as associated wages, are expected under the alternatives considered.
PC_09-17-2013_12_Gregory Miller	Evacuation routes vulnerable - for south shore of Lake Pontchartrain and river region, all roads leading west would be vulnerable.	When severe weather strikes it's critical to think about your safety and your family's safety. Local emergency planning is the responsibility of the State of Louisiana and local municipalities. The USACE encourages you to listen carefully to the direction of local officials and prepare to evacuate if it becomes necessary. Only stay at home if you have NOT been ordered to evacuate by local officials. Listen to local officials and be ready to evacuate. Evacuation plans by locals should be enacted well before the occurrence of storm surges into an area. Residents could be requested to evacuate even behind a levee. The main purpose of a levee is for the protection of property not life or limb. Durations of flooding in street will be highly depended on the type of storm event. Access may be limited into areas for other reasons not related to flooding (e.g. debris, downed power lines). The State of Louisiana's Emergency Preparedness Guide states that "You should be prepared to sustain yourself and your family away from your home for several days or, in a worst-case scenario, several weeks or even months. The guide also advises that the "government agencies may not be able to react as quickly as you think they should."
PC_09-17-2013_13_Gregory Miller	Environmental damage from SLR is impacting BLH and swamp. Preservation requires protection through levees to avoid further degradation from saltwater intrusion.	Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area. In addition with the closure of the MRGO there has been a freshening trend on the west side of Lake Pontchartrain.
PC_09-17-2013_14_Gregory Miller	Economic analysis failed to include Isaac flooding in the assessment, and the post-construction impact on communities outside the alignment.	The storm surge modeling was not based on historical storms, but statistical storm surge models. These models are verified using data collected from past storms such as Issac. The WSLP modeling data was verified using Issac data. The Localized storm surge reduction measures were modified for the final report.
PC_09-17-2013_15_Gregory Miller	Economic analysis failed to include increased costs of non-structural measures in communities outside the alignment.	The storm surge modeling was not based on historical storms, but statistical storm surge models. These models are verified using data collected from past storms such as Issac. The WSLP modeling data was verified using Issac data. The Localized storm surge risk reduction measures were modified for the final report.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-17-2013_16_Ricky Delatte	Concern that just changing the areas where flooding is expected. Blind River will flow into area, regardless of alignment,	The localized storm surge risk reduction measures have been modified for the final report. There are now a limited number of raising of structures in the Parish. Additional discussion was added to the final report related to induced flooding potential. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .01-.02 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed.
PC_09-17-2013_17_Ricky Delatte	Suggest new alignment along Western bank f Lake Pontchartrain (into Tpahoa parish) with 2 locks/pumping stations, covers Lake Maurepas and surrounding area. Better than incremental cost of SJBP, then St James, the Ascension. Follow railroad all the way to Ponchatoula from BC spillway.	This alignment went would have the potential to have a significantly greater direct and indirect impact on Swamp and Bottom land hard woods. Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area. The addition of navigable locks would also substantially increase the cost of the project.
PC_09-17-2013_18_Ruby White	Request for information on zoning, BW12, insurance rates (referred by Varisco to Robottom/ local planning)	Comment noted – Your local parish representatives should provide you that information.
PC_09-17-2013_19_Jimmy Brazan / Timmy Roussel	Concerns about St James being left out, funnel effect towards St. James parish. Will result in street flooding, sewer backing up, regardless of non-structural. Recommend Alt D.	As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages. The additional outreach methods used include canvassing of neighborhoods, as well as public meetings that were not always specific to environmental justice, yet provided ample opportunity for the public to comment and be involved in the planning process. Appropriate public involvement strategies will continue to be used as the project progresses.
PC_09-17-2013_20_Jimmy Brazan / Timmy Roussel	Concerns that highway access will be cut off with Alt C.	No transportation corridor will be closed permanently. There may be temporary closures during construction and during storm events.
PC_09-17-2013_21_Jimmy Brazan / Timmy Roussel	Concern that electrical power will be cut off with Alt C in times of hurricane.	A levee will not change the chance that a wind event will knock out electrical service to an area.
PC_09-17-2013_22_Jimmy Brazan / Timmy Roussel	Concern that Alt C is a piecemeal approach. Desired a comprehensive flood protection plan	The final document is a comprehensive storm risk reduction plan for the study area.
PC_09-17-2013_23_Jimmy Brazan / Timmy Roussel	Need economic analysis broken down into layman's terms.	Comment noted
PC_09-17-2013_24_Paul Bair	Concern that levee alignment will split property in half, and will result in shutdown of Cajun Pride Swamp tours business.	Please see responses to unique identifier CD _9-18-2013_1_David Vitter for concerns about Cajun Prides Swamp tours.
PC_09-17-2013_25_Scott Eustis, Gulf Restoration Network	Essence of the problem is that we need levees, we need to elevate behind the levees, and wetlands (esp Maurepas wetlands) to protect humans and the levees.	Comment noted
PC_09-17-2013_26_Scott Eustis, Gulf Restoration Network	Alt C divides communities, pits communities against environment.	Comment noted
PC_09-17-2013_27_Scott Eustis, Gulf Restoration Network	Document is rushed to completion.	Comment noted
PC_09-17-2013_28_Scott Eustis, Gulf Restoration Network	Did not account for subsidence in the documents. And the cost associated with that.	Subsidence and other comments of RSLR were considered in the developing the plan.
PC_09-17-2013_29_Scott Eustis, Gulf Restoration Network	Did not account for appropriate drainage in the plan.	The design of system's cross section was based on the existing cross section. The use of the pump station is only for storm surge events. Under rainfall events the system will be left open and match the existing FWOP drainage conditions.
PC_09-17-2013_30_Scott Eustis, Gulf Restoration Network	Did not account for the benefits of MLOD.	Existing swamp in front of levee was accounted for in Modeling.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-17-2013_31_Tony Schexnayder	Rainwater not accounted for in plan	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authorization allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events.
PC_09-17-2013_32_Tony Schexnayder	Alt C will result in induced flooding for St James. Recommend Alt D.	The risk for induced flooded was much higher with Alignment D. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_09-17-2013_33_Tony Schexnayder	Evacuation routes will be impacted, increasing risk to human life and safety.	When severe weather strikes it's critical to think about your safety and your family's safety. Local emergency planning is the responsibility of the State of Louisiana and local municipalities. The USACE encourages you to listen carefully to the direction of local officials and prepare to evacuate if it becomes necessary. Only stay at home if you have NOT been ordered to evacuate by local officials. Listen to local officials and be ready to evacuate. Evacuation plans by locals should be enacted well before the occurrence of storm surges into an area. Residents could be requested to evacuate even behind a levee. The main purpose of a levee is for the protection of property not life or limb. Durations of flooding in street will be highly depended on the type of storm event. Access may be limited into areas for other reasons not related to flooding (e.g. debris, downed power lines). The State of Louisiana's Emergency Preparedness Guide states that "You should be prepared to sustain yourself and your family away from your home for several days or, in a worst-case scenario, several weeks or even months. The guide also advises that the "government agencies may not be able to react as quickly as you think they should."
PC_09-17-2013_34_Tony Schexnayder	Suggest pumping excess water to the river. Like Romeville area canals.	Comment noted
PC_09-17-2013_35_Dr. Annrose Guarino	Subsidence evidence for generations. Recommend railroad levee choice.	This alignment went would have the potential to have a significantly greater direct and indirect impact on Swamp and Bottom land hard woods. Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area. The addition of navigable locks would also substantially increase the cost of the project.
PC_09-17-2013_36_Dr. Annrose Guarino	Absent a railroad alt, asks for St James to be included (Alt D)	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_09-17-2013_37_Reynold Hernandez	Alt D will not have the environmental impact feared, because water flows north towards the swamp. Will still provide the environmental benefit of storm surge reduction. (Same as the old Alt B). Alt D will have same impact as what is in place with I-10 - no difference.	Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area.
PC_09-17-2013_38_Wayne Naquin	Alt D is recommended. But blocking surge at Chef's pass (or Rigolet's pass) would be a better solution.	There is no data that suggests blocking storm surge at Chef's pass via the 'Barrier Plan' would reduce storm surge for the western portions of the basin, specifically the West Shore study area. The Barrier Plan was initially recommended for the Lake Pontchartrain and Vicinity project but was shelved in favor of the risk reduction system that is currently in place. Any alternatives having to do with a barrier plan are well outside of the study authority for the West Shore project which is specific to St. Charles, St. John the Baptist, and St. James parishes.
PC_09-17-2013_39_Latonya Cressy	Request for a physical model to show differences between alternative alignments.	Comment noted
PC_09-17-2013_40_Mike Sharpe	Does alternative assessment include non-residential structures, as well (industry, commercial)? Varisco answered - yes.	Non-residential structures are considered in the economic analysis.
PC_09-17-2013_41_Dina Martin	Fled New Orleans after Katrina, to safer LaPlace, to an area that had not flooded in >30 years. 7 years later, flooded again. Dislike Alts A and C. Wants to help community survive.	Comment noted.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-17-2013_42_Arthur Jones	Prefers Alt D for the extra 10M, to improve project for adjacent communities.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_09-17-2013_43_Arthur Jones	Life safety is concern, worth more than 10M, which would be spent anyway on Fed side.	When severe weather strikes it's critical to think about your safety and your family's safety. Local emergency planning is the responsibility of the State of Louisiana and local municipalities. The USACE encourages you to listen carefully to the direction of local officials and prepare to evacuate if it becomes necessary. Only stay at home if you have NOT been ordered to evacuate by local officials. Listen to local officials and be ready to evacuate. Evacuation plans by locals should be enacted well before the occurrence of storm surges into an area. Residents could be requested to evacuate even behind a levee. The main purpose of a levee is for the protection of property not life or limb. Durations of flooding in street will be highly depended on the type of storm event. Access may be limited into areas for other reasons not related to flooding (e.g. debris, downed power lines). The State of Louisiana's Emergency Preparedness Guide states that "You should be prepared to sustain yourself and your family away from your home for several days or, in a worst-case scenario, several weeks or even months. The guide also advises that the "government agencies may not be able to react as quickly as you think they should."
PC_09-17-2013_44_Sylvia Dunn	Concern that additional study will delay construction, until St James floods, too.	Concern noted
PC_09-17-2013_45_James Stephens	Alt C, or any alt that does nto go to St James, will impact economic development as developers will decline to invest in unprotected property.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_09-17-2013_46_Everett Powell	Can there be a phased approach to the construction, to begin construction earlier?	Comment noted – Congressional Authorization would be needed for phased approach.
PC_09-17-2013_47_Everett Powell	What is the time frame for construction (Varisco - it is up to the deciders in Congress), and will that affect residents (Varisco - yes. But the public meeting is a vehicle to get the opinions to Congress. But can also voice concerns to representatives.	Congressional Authorization and appropriations would be needed before construction could begin.
PC_09-17-2013_48_Natalie Robottom	Alignment D is the selection for full congressional delegation, including a letter from Sen Vitter. Will continue to work to get approval and funding.	Congress could authorize and appropriate funds for Alternative D.
PC_09-17-2013_49_Anthony Waguespack	Alignment D is best. And extend it to Gonzales or Baton Rouge, for better protection	Congress could authorize additional study to extend the study area.
PC_09-17-2013_50_Steve Wilson	Alternative D is preferred plan	Comment noted
PC_09-17-2013_51_Steve Wilson	Environmental concerns with destroying wetlands	Comment noted
PC_09-17-2013_52_Steve Wilson	40 years of study is not a 'rush study'	Comment noted
PC_09-17-2013_53_Tony Schexnayder	Request to make it personal, and not just economic	Comment noted
PC_09-10-2013_1_Karen Dunn	Rain and street flooding also a problem, not just storm surge	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authorization allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-10-2013_2_Karen Dunn	Backflooding an additional impact, required out of pocket expenses.	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authorization allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events.
PC_09-10-2013_3_Karen Dunn	Concerned about rezoning, and changing of insurance requirements after the fact. Moving out is not an option (husband is in sherriff's office, with residency requirement)	Comment noted – Your local parish representatives should provide you that information.
PC_09-10-2013_4_Karen Dunn	Non-structural is a problem for the cost burden	Comment noted
PC_09-10-2013_5_Karen Dunn	Non-structural is a problem for emergency access.	When severe weather strikes it's critical to think about your safety and your family's safety. Local emergency planning is the responsibility of the State of Louisiana and local municipalities. The USACE encourages you to listen carefully to the direction
PC_09-10-2013_6_Karen Dunn	Submitted pictures and elevation levels for Corps consideration in making decision.	Thanks for the additional information.
PC_09-10-2013_7_Louis Kliebert	Concerns about plan for Convent substation if underwater (power failure) - impact to St James	As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_09-10-2013_8_Louis Kliebert	Concerns about evacuation - if 61, 3125, and I-10 all flood, how will traffic pass?	When severe weather strikes it's critical to think about your safety and your family's safety. Local emergency planning is the responsibility of the State of Louisiana and local municipalities. The USACE encourages you to listen carefully to the direction of local officials and prepare to evacuate if it becomes necessary. Only stay at home if you have NOT been ordered to evacuate by local officials. Listen to local officials and be ready to evacuate. Evacuation plans by locals should be enacted well before the occurrence of storm surges into an area. Residents could be requested to evacuate even behind a levee. The main purpose of a levee is for the protection of property not life or limb. Durations of flooding in street will be highly depended on the type of storm event. Access may be limited into areas for other reasons not related to flooding (e.g. debris, downed power lines). The State of Louisiana's Emergency Preparedness Guide states that "You should be prepared to sustain yourself and your family away from your home for several days or, in a worst-case scenario, several weeks or even months. The guide also advises that the "government agencies may not be able to react as quickly as you think they should."
PC_09-10-2013_9_Timmy Roussel	Concern about saltwater intrusion affecting the Perique tobacco - unique cultural heritage. (Prime/unique farmland?)	Agricultural losses were investigated but potential acres impacted were only identified through inundation maps, and land use maps. Studies in the past have captured benefits associated with damages to crops, but due to the nature of the crop this benefit category was not calculated and included in the NED category. The study area's major crop is sugarcane. Currently there is no empirical data to show that there are historical large scale losses of sugarcane crops in the study area. Damages to crops have to be evaluated through probabilistic method. With-out empirical data, determining flood losses associated with sugarcane is a complex determination due to the fact that is flooded sugarcane is not always total loss from storm surge flooding. If it cannot be used for sugar production, it could still be cut and reused as "seedcane". Cut flooded stalks or stalk sections, called billets, can be planted, and the stalk buds germinate and grow to produce the next crop. The use of flooded billets can help to off set the loss of sugar production vs. the cost for planting the next crop. The inclusion Perique tobacco as a crop damaged by storm surge was also investigated in the study process but there was limited empirical data to show that the crop is damaged by storm surges events. When factoring in the probability of flooding (when and how often does flooding occur in a particular location) and consequences (potential damages associated with flooding), there is limited risk for damages to Perique tobacco from storm surges, due to the fact the crop is grown outside of the hurricane season.
PC_09-10-2013_10_Henry Friloux	Protection of tri-parish business and industrial facilities, so they don't have to shut down, is critical. Federal impact, not just local. Alt C leaves exposed areas.	As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_09-10-2013_11_Henry Friloux	I-10 as evacuation route for New Orleans. Needs to be protected. Recommend Alt D.	When severe weather strikes it's critical to think about your safety and your family's safety. Local emergency planning is the responsibility of the State of Louisiana and local municipalities. The USACE encourages you to listen carefully to the direction of local officials and prepare to evacuate if it becomes necessary. Only stay at home if you have NOT been ordered to evacuate by local officials. Listen to local officials and be ready to evacuate. Evacuation plans by locals should be enacted well before the occurrence of storm surges into an area. Residents could be requested to evacuate even behind a levee. The main purpose of a levee is for the protection of property not life or limb. Durations of flooding in street will be highly depended on the type of storm event. Access may be limited into areas for other reasons not related to flooding (e.g. debris, downed power lines). The State of Louisiana's Emergency Preparedness Guide states that "You should be prepared to sustain yourself and your family away from your home for several days or, in a worst-case scenario, several weeks or even months. The guide also advises that the "government agencies may not be able to react as quickly as you think they should."
PC_09-10-2013_12_Henry Friloux	Will provide economic data to help.	Thanks for the additional information.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-10-2013_13_Lionel Bailey	Concerned that Alt C selection decision was made, and public input/NEPA inputs were not included in the predetermined position. Recommend Alt D.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_09-10-2013_14_Willy Martin	President Obama stated that the flooding that happened with Isaac should not happen again. And Alt C does not do that.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_09-10-2013_15_Willy Martin	Agricultural comment, Perique. But also sugar cane and soybeans.	Agricultural losses were investigated but potential acres impacted were only identified through inundation maps, and land use maps. Studies in the past have captured benefits associated with damages to crops, but due to the nature of the crop this benefit
PC_09-10-2013_16_Willy Martin	Concerned that economic evaluation did not capture economic benefits from emergency response costs - evacuation routes of I-10, 61, 3125	A reduction in traffic delays, associated with emergency response activities following a tropical storm surge, is a potential economic benefit that can be attributable for each of the alternatives considered in this study. However, compared to the reduction in physical damages to property, this category is expected to represent a relatively small portion of total economic benefits. Also, since the computation of these benefits were not needed to confirm the economic justification of the project, the development of a regional traffic delay model needed to compute these benefits was not pursued. With respect to the use of major state and Federal highways for pre-storm evacuation, none of the plans would provide economic benefits since these routes are closed to traffic within a minimum of 24 hours prior to tropical storm landfall and cannot be used whether or not a levee system is in place.
PC_09-10-2013_17_Willy Martin	Concerned that economic evaluation did not include damages prevented from floodfighting effort that saved property.	Damages are forecasted using a combination of storm surge modeling and an interior rainfall model that predicts water levels associated with various types of storms. These are theoretical storms and are not based on actual events. Therefore, if flood-fighting prevented damages attributable to existing storms like Isaac occur, it in no way prevents or reduces the amount of forecasted damages via the Corps' modeling.
PC_09-10-2013_18_Jude Cambre	Recommends Alt D. Alt C is a crucifixion.	Comment noted
PC_09-10-2013_19_Pat Barker	Alt C will result in a change to the flood zone maps, making a no-flood zone into a flood zone. Alternative D recommended.	Additional discussion was added to the final report. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .01-.02 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_09-10-2013_20_Thomas Marcantel	Railroad track alignment - Lake side of the tracks recommend building an alignment there. Levee along lakefront. Lock at Manchac pass	This alignment went would have the potential to have a significantly greater direct and indirect impact on Swamp and Bottom land hard woods. Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area. The addition of navigable locks would also substantially increase the cost of the project.
PC_09-10-2013_21_Thomas Marcantel	Railroad alignment would require a pump, but would avoid the competition among parishes for induced damages.	The potential to cause induced damages on Tangipahoa and St. Tammany Parish from this alignment would have to be investigated.
PC_09-10-2013_22_Thomas Marcantel	Economic impact to industry and business needs to be captured.	Impacts to industry and business were part of the economic analysis.
PC_09-10-2013_23_Ed Price	Alt D best for St James and Ascension.	Comment noted

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-10-2013_24_Shelley Donadieu	If Alt C is selected for community cohesion and agri benefits, why is St John more worthy than St James and Ascension?	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity.
PC_09-10-2013_25_Shelley Donadieu	Flood fighting kept St James from flooding; that should not be a determining factor in deciding on an alternative.	Damages are forecasted using a combination of storm surge modeling and an interior rainfall model that predicts water levels associated with various types of storms. These are theoretical storms and are not based on actual events. Therefore, if flood-fighting prevented damages attributable to existing storms like Isaac occur, it in no way prevents or reduces the amount of forecasted damages via the Corps' modeling.
PC_09-10-2013_26_Shelley Donadieu	Marshes are a barrier for St John. Why not equal treatment for St James?	Comment noted
PC_09-10-2013_27_Shelley Donadieu	Even small communities have a reason to be protected: industry (sugar cane, ag, refineries, Zapp's, sugar refineries)	Impacts to industry and business were part of the economic analysis.
PC_09-10-2013_28_Shelley Donadieu	Transportation needs to be protected - to benefit other larger communities. Roads at risk of flooding.	Impacts to I-10 were investigated in the study process but in the review of the sections of I-10 in St. James Parish showed that when factoring in the probability of flooding (when and how often does flooding occur in a particular location) and consequences (potential damages associated with flooding), there is limited NED benefits to be gained. Flooding of large segments of I-10 does occur, but not until later in the study period. Even with flooding of the roadway, the impacts would only be temporary impacts. Large NED benefits related to roadway flooding are only typically gained when roadways are washed out and impacts such as road closures are long lasting. The loss of the I-10 twin spans after Katrina is an example of this scenario. The nature of the flooding in the future is not consistent with this condition. The inclusion of the potential transportation impacts in the report were included to show that there could be impact but they may not be related to a NED impact.
PC_09-10-2013_29_Barry Waguespack	Successful flood fighting saved his house, but increasing annually the surge since built house - outside of flood zone - in 2000.	Comment noted
PC_09-10-2013_30_Adele Berthelot	Alt D recommended	Comment noted
PC_09-10-2013_31_Adele Berthelot	Recommend adding gypsum from Mosaic gypsum mounds to make the levees impermeable to lower the cost. (Gypsum currently viewed as waste product)	At this time, gypsum is considered a waste product and not considered as a type of soil that can be used in the construction of a levee. Any new type of material to be used in a levee would need to undergo significant tests and environmental clearances before it could be utilized in construction of an earthen levee.
PC_09-10-2013_32_Robert Foucheux	Alt D recommended. Alt C will allow more water into parish.	Additional discussion was added to the final report. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .01-.02 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. In the case of Alignment D any induced stages on the existing non-Federal levee could not change the fragility of the existing levee. Any impacts would have to be mitigated for and the cost would be borne by that project. In most cases this would mean additional cost will be added to a project with no additional benefits. The federal project would still end at the tie-in point, after mitigating for any impacts. Investigating impacts from the Lake Pontchartrain and Vicinity Program is outside the WSLP study authority.
PC_09-10-2013_33_Robert Foucheux	Rigolets barrier recommended.	There is no data that suggests blocking storm surge at Chef's pass via the 'Barrier Plan' would reduce storm surge for the western portions of the basin, specifically the West Shore study area. The Barrier Plan was initially recommended for the Lake Pontchartrain and Vicinity project but was shelved in favor of the risk reduction system that is currently in place. Any alternatives having to do with a barrier plan are well outside of the study authority for the West Shore project which is specific to St. Charles, St. John the Baptist, and St. James parishes.
PC_09-10-2013_34_Robert Foucheux	Alt C will constitute a taking, violating Article V of the Constitution.	Comment noted

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-10-2013_35_Brandon Gravois	56 inches of rain annual on average, 2012 was 70. Prior to Isaac, got 12". During storm, another 12 inches. All retention was full. And then surge hit on the 3rd/4th day. Need help more than just locals sandbagging.	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authorizing allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events.
PC_09-10-2013_36_Brandon Gravois	Evacuation/traffic problems because of 61 and 10 closure. All traffic through 3125, jammed and prevented sand trucks in. Alt D would protect the evac routes, as well.	When severe weather strikes it's critical to think about your safety and your family's safety. Local emergency planning is the responsibility of the State of Louisiana and local municipalities. The USACE encourages you to listen carefully to the direction
PC_09-10-2013_37_Brandon Gravois	61 has 4 culverts with one bridge; otherwise would have been like St John.	Thanks for the information.
PC_09-10-2013_38_Brandon Gravois	Additional gages needed, to provide on-the-ground information for dissemination to parishes and emergency personnel.	Comment noted.
PC_09-10-2013_39_Glenn Vicknair	GNO HSDRRS responsible for flooding in SJBP - unintended consequences. Likewise, if Alt C is selected and built, water will go to St James.	Additional discussion was added to the final report. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .01-.02 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. In the case of Alignment D any induced stages on the existing non-Federal levee could not change the fragility of the existing levee. Any impacts would have to be mitigated for and the cost would be borne by that project. In most cases this would mean additional cost will be added to a project with no additional benefits. The federal project would still end at the tie-in point, after mitigating for any impacts. Investigating impacts from the Lake Pontchartrain and Vicinity Program is outside the WSLP study authority.
PC_09-10-2013_40_Glenn Vicknair	Non-structural emphasis is not enough.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_41_Glenn Vicknair	Wildlife impacts are overblown - fishing in Blind River was never any good, anyway. Project overestimates the impacts to wildlife for Alt D.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_42_Dennis Troxclair	Community cohesion value not adequately valued.	The updated localized storm surge risk reduction measures eliminate impacts to community cohesion.
PC_09-10-2013_43_Dennis Troxclair	Non-structural lifts are under-costed - 30k per house, 1500 homes, 45 million dollars. (10M to extend, 10<45, QED.)	The localized storm surge risk reduction measures have been modified for the final report. The berms in the recommendation would provide additional risk reduction to infrastructure in St. James Parish, compared the TSP
PC_09-10-2013_44_Dennis Troxclair	St James growing community. Project undervalues future development, and the impact of flood insurance on this area will kill development.	Comment noted. A clarification has been made in the final report.
PC_09-10-2013_45_Dennis Troxclair	Flood insurance will disproportionately impact poor, will make them unable to sell, build, develop, or even just live there.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_46_Dennis Troxclair	Recommend Alt D.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_47_Jason Amato	Nonstructural is a nonstarter with Alt C. Evacuation issues will ensue.	The localized storm surge risk reduction measures have been modified for the final report. The berms in the recommendation would provide additional risk reduction to infrastructure in St. James Parish, compared the TSP
PC_09-10-2013_48_Jason Amato	Transportation benefits not being captured - interstate, highways, railroads open	Impacts to I-10 were investigated in the study process but in the review of the sections of I-10 in St. James Parish showed that when factoring in the probability of flooding (when and how often does flooding occur in a particular location) and consequences (potential damages associated with flooding), there is limited NED benefits to be gained. Flooding of large segments of I-10 does occur, but not until later in the study period. Even with flooding of the roadway, the impacts would only be temporary impacts. Large NED benefits related to roadway flooding are only typically gained when roadways are washed out and impacts such as road closures are long lasting. The loss of the I-10 twin spans after Katrina is an example of this scenario. The nature of the flooding in the future is not consistent with this condition. The inclusion of the potential transportation impacts in the report were included to show that there could be impact but they may not be related to a NED impact.
PC_09-10-2013_49_Jason Amato	Benefits not captured for industry staying open.	Impacts to industry and business were part of the economic analysis.
PC_09-10-2013_50_Jason Amato	Use Katrina as a model for the benefits of protecting homes. Calculate the benefits for preventing such a stiuation.	A suite of 120 storms is run and re-run to simulate conditions for a range of storms in the study area. This is applied to the 50 year planning window that the Corps investigates and damages (and the resultant reduction of damages were a risk reduction system in place) is calculated. Therefore, the reduction of damages over time is calculated as presented in both the draft and final reports.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-10-2013_51_Jason Amato	Alt D or B. Not C	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_52_Kurt Roussel	Recommend Alt D.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_53_Kurt Roussel	Backwater flooding from diversion canal. Should be extended to the lake, not Blind R.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_54_Kurt Roussel	Houses that are raised will result in more houses to protect.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_55_Kurt Roussel	Inverse correlation between water in St John, St James: when St John waters receded (8") St James increased (8")	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_56_Kurt Roussel	Without Alignment D. we will become St James Retention Pond.	Additional discussion was added to the final report. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .01-.02 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. In the case of Alignment D any induced stages on the existing non-Federal levee could not change the fragility of the existing levee. Any impacts would have to be mitigated for and the cost would be borne by that project. In most cases this would mean additional cost will be added to a project with no additional benefits. The federal project would still end at the tie-in point, after mitigating for any impacts. Investigating impacts from the Lake Pontchartrain and Vicinity Program is outside the WSLP study authority.
PC_09-10-2013_57_Max Nassar	NEPA process requires that multiple considerations in decision making, one of which is cost. Presentation shows cost as ONLY driver.	The human and natural environment not just cost has been considered in this document.
PC_09-10-2013_58_Max Nassar	Cost to St James not considered	Economic impacts to St. James have been considered.
PC_09-10-2013_59_Max Nassar	Should combine the Blind River and WSLP projects for NEPA compliance.	The USACE's planning teams for the LCA ecosystem restoration studies/projects (LCA Small Diversion at Convent/Blind River (CBRD) and LCA Amite River Diversion Canal Modification (ARDC) projects), the CWPPRA Maurepas Diversion study planning team and the WSLP study planning teams have been working with each other since the inception of each of these projects. The apparent inconsistency between these projects/programs is the need to provide hurricane and storm surge damage risk reduction for human populations at risk living adjacent to the Maurepas Swamp ecosystem that is presently undergoing habitat fragmentation and conversion to marsh and open water due to a number of natural and man-made problems. The WSLP Recommended Plan alignment minimizes, to the maximum extent practicable, adverse potential impacts to significant human and natural resources. The WSLP Recommended Plan includes measures to maintain hydrologic exchange/connectivity between the protected (interior) and non-protected (exterior) side wetlands. In addition, closure of the risk reduction system during storm events would prevent more saline waters associated with hurricane and storm surge events as well as increasing relative sea level rise levels from adversely impacting enclosed wetlands.
PC_09-10-2013_60_Max Nassar	Emergency costs and costs from impacts to business and industry not well represented. Use Norco (Cat Cracker explosion) for calculating value to nation of preventative measures.	As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_09-10-2013_61_Max Nassar	Support Alt D.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_62_Mark Anderson	Support Alt D. Neighbors don't flood neighbors. Everyone wants it.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_63_Kirk Deroche	Oil refineries staying open requires Alt D	As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_09-10-2013_64_Kirk Deroche	If we build a canal on the other side, combined with Alt D, put locks in to keep freshwater in Shell Beach area out there, help environment, benefit the residents, improve wildlife through improved circulation	Comment Acknowledged, thanks for your comment.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-10-2013_65_Denise Nosacka	Support Alt D. Water has to go somewhere, and if not St John, will impact St James.	As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages. Additional outreach methods used included canvassing of neighborhoods, as well as public meetings that were not always specific to environmental justice, yet provided ample opportunity for the public to comment and be involved in the planning process. Appropriate public involvement strategies will continue to be used as the project progresses. .
PC_09-10-2013_66_Denise Nosacka	Emergency costs and costs from impacts to business and industry not well represented. Shut down costs will impact lots of people.	Emergency costs and costs from impacts to businesses and industry was included in the Economic analysis.
PC_09-10-2013_67_Alvin St Pierre	Community cohesion value not adequately valued.	The updated localized storm surge risk reduction measures eliminate impacts to community cohesion.
PC_09-10-2013_68_Alvin St Pierre	7th Graders sandbagging, people working together, keeping industry running.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_69_Alvin St Pierre	Alt D recommended	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_70_Ryan Donadieu	Incorrect assessment of cost for raising homes - 160k for a 2500 sqft. 1571 homes, 256 million. Adjusting for future costs (not able to fund all right now) inflation will more than cover the 10M difference.	The localized storm surgerisk reduction measures have been modified for the final report. There are now a limited number of raising of structures in the Parish.
PC_09-10-2013_71_Ryan Donadieu	O&M costs should not be applied.	The Corps policy and guidelines requires all feasibility reports to disclose the full cost of operating and maintaining a federal project.
PC_09-10-2013_72_Ryan Donadieu	Levee impacts on saltwater encroachment will be beneficial to marsh, not negative impacts. Hope canal, freshwater diversion will provide freshwater for swamps.	Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area. In addition with the closure of the MRGO there has been a freshening trend on the west side of Lake Pontchartrain.
PC_09-10-2013_73_Ryan Donadieu	FWOP will include saltwater in the swamp if nothing done. Levee will protect it.	Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area. In addition with the closure of the MRGO there has been a freshening trend on the west side of Lake Pontchartrain.
PC_09-10-2013_74_Ryan Donadieu	Alt D recommended	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_75_Terry Borne	As mayor of Gramercy, it was horrifying to watch Isaac - 15 houses lost.	Comment noted
PC_09-10-2013_76_Terry Borne	Alt D recommended, otherwise, will be worse next time.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_77_Robert Roussel	Refinery shutdown costs not captured, or the recommended plan would not be Alt D. Dept of Energy called after Katrina, concerned about the cost to the nation if not opened again immediately.	As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas.
PC_09-10-2013_78_Robert Roussel	Emergency transport on I-10 disallowed people to get back to the refineries to get them back on line.	When severe weather strikes it's critical to think about your safety and your family's safety. Local emergency planning is the responsibility of the State of Louisiana and local municipalities. The USACE encourages you to listen carefully to the direction of local officials and prepare to evacuate if it becomes necessary. Only stay at home if you have NOT been ordered to evacuate by local officials. Listen to local officials and be ready to evacuate. Evacuation plans by locals should be enacted well before the occurrence of storm surges into an area. Residents could be requested to evacuate even behind a levee. The main purpose of a levee is for the protection of property not life or limb. Durations of flooding in street will be highly depended on the type of storm event. Access may be limited into areas for other reasons not related to flooding (e.g. debris, downed power lines). The State of Louisiana's Emergency Preparedness Guide states that "You should be prepared to sustain yourself and your family away from your home for several days or, in a worst-case scenario, several weeks or even months. The guide also advises that the "government agencies may not be able to react as quickly as you think they should."
PC_09-10-2013_79_Robby Lear	12 plans of action in Appendix K dated between 2007 and 80s - nothing after Gustav or Isaac. Lessons learned were not incorporated.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_80_Robby Lear	USFWS letter offered two additional alternatives not addressed except in the letter. Why not further investigated? Reduction in impacts to Maurepas wetlands (56k acres to 13k) - $200M difference.	Alignments C-la and C-lb were review as part of the study process but they were not included because the alternatives would have similar benefits and cost as Alignment D. Also, the indirect impacts maybe limited with these Alignments but the direct impact were estimated to be greater due to the fact that the total length of the alignment is greater than D.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-10-2013_81_Robby Lear	Surge modeling appears to only figure the needed levee heights, but does not address pre-development and post-development flooding for each alternative (Alt D will provides ull protection, and induced flooding will be zero)	As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages. Additional outreach methods used included canvassing of neighborhoods, as well as public meetings that were not always specific to environmental justice, yet provided ample opportunity for the public to comment and be involved in the planning process. Appropriate public involvement strategies will continue to be used as the project progresses. .
PC_09-10-2013_82_Robby Lear	If post-levee construction modeling of the flood is done at different levee elevations, what does that do to the community and the flooding?	The updated localized storm surge risk reduction measures eliminate impacts to community cohesion.
PC_09-10-2013_83_Dalton Johnson	St John gets flood protection, St James gets flood. Inequity for Alt C pointed out.	As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages. Additional outreach methods used included canvassing of neighborhoods, as well as public meetings that were not always specific to environmental justice, yet provided ample opportunity for the public to comment and be involved in the planning process. Appropriate public involvement strategies will continue to be used as the project progresses. .
PC_09-10-2013_84_Barry Waguespack	Invested 30k in creating a non-structural alternative to raising (floodwall around house) still need to be there to close gate, rather than evacuating.	When severe weather strikes it's critical to think about your safety and your family's safety. Local emergency planning is the responsibility of the State of Louisiana and local municipalities. The USACE encourages you to listen carefully to the direction of local officials and prepare to evacuate if it becomes necessary. Only stay at home if you have NOT been ordered to evacuate by local officials. Listen to local officials and be ready to evacuate. Evacuation plans by locals should be enacted well before the occurrence of storm surges into an area. Residents could be requested to evacuate even behind a levee. The main purpose of a levee is for the protection of property not life or limb. Durations of flooding in street will be highly depended on the type of storm event. Access may be limited into areas for other reasons not related to flooding (e.g. debris, downed power lines). The State of Louisiana's Emergency Preparedness Guide states that "You should be prepared to sustain yourself and your family away from your home for several days or, in a worst-case scenario, several weeks or even months. The guide also advises that the "government agencies may not be able to react as quickly as you think they should."
PC_09-10-2013_85_Woody Pollet	Medical treatments are needed, and when road closures prevent evacuation to different facilities, the result is tragic. Consider this in deciding, and choose Alt D.	When severe weather strikes it's critical to think about your safety and your family's safety. Local emergency planning is the responsibility of the State of Louisiana and local municipalities. The USACE encourages you to listen carefully to the direction of local officials and prepare to evacuate if it becomes necessary. Only stay at home if you have NOT been ordered to evacuate by local officials. Listen to local officials and be ready to evacuate. Evacuation plans by locals should be enacted well before the occurrence of storm surges into an area. Residents could be requested to evacuate even behind a levee. The main purpose of a levee is for the protection of property not life or limb. Durations of flooding in street will be highly depended on the type of storm event. Access may be limited into areas for other reasons not related to flooding (e.g. debris, downed power lines). The State of Louisiana's Emergency Preparedness Guide states that "You should be prepared to sustain yourself and your family away from your home for several days or, in a worst-case scenario, several weeks or even months. The guide also advises that the "government agencies may not be able to react as quickly as you think they should."
PC_09-10-2013_86_Katy Isabel	Mission of the Army is to protect people of the US; one community not more deserving of protection than another.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_87_Katy Isabel	Community is important, and is not valued enough in this project. Alternative D would do that.	The updated localized storm surge risk reduction measures eliminate impacts to community cohesion.
PC_09-10-2013_88_Pat Tremonte	Environmental degradation is is real in the area around Lake Pontchartrain. Surround the lakes, stop the water. Best solution.	Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area. In addition with the closure of the MRGO there has been a freshening trend on the west side of Lake Pontchartrain.

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_09-10-2013_89_Shelly Warren	Previous public meeting requested a harder look at Alt D. Came back still recommending Alt C. Was there any further evaluation done? Does not seem that there was.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_09-10-2013_90_Brandon Gravois	Diversion canals (New Hope and Romeville) produce 2200 cfs. During wet years, this will provide surplus water, which would lead to flooding in the event of a storm.	Comment Acknowledged, thanks for your comment.
PC_09-10-2013_91_Willy Martin, Jr.	Induced flooding has not been explained well, and the results are not trusted.	As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages. Additional outreach methods used included canvassing of neighborhoods, as well as public meetings that were not always specific to environmental justice, yet provided ample opportunity for the public to comment and be involved in the planning process. Appropriate public involvement strategies will continue to be used as the project progresses. .
PC_09-10-2013_92_Willy Martin, Jr.	Benefits from reduced road closures have not been quantified well.	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authority allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events. The final plan has been modified to include localized storm surge risk reduction measures near the developed areas discussed in your comment.
PC_09-10-2013_93_Willy Martin, Jr.	Economic effects on industry for the nation have not been well quantified, or Alt D would have been selected.	The localized storm surge risk reduction measures have been modified for the final report. The berms in the recommendation would provide additional risk reduction to infrastructure in St. James Parish, compared the TSP
PC_09-10-2013_94_Timmy Roussel	Community will get data needed to affect final decision.	This Final Document is the source of additional information and data.
PC_41549_1_Randy Clouatre	Alt D is preferred.	Comment Acknowledged, thanks for your comment.
PC_41549_2_Randy Clouatre	Economic development and industry benefits need to be considered	The localized storm surge risk reduction measures have been modified for the final report. The berms in the recommendation would provide additional risk reduction to infrastructure in St. James Parish, compared the TSP

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_41549_3_Randy Clouatre	Concerns about induced flooding for St James as part of Alt C	As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages. Additional outreach methods used included canvassing of neighborhoods, as well as public meetings that were not always specific to environmental justice, yet provided ample opportunity for the public to comment and be involved in the planning process. Appropriate public involvement strategies will continue to be used as the project progresses. .
PC_41549_4_Bill Roux	Ascension parish benefits not included because outside of authority. Skewed benefits. Alt D would better serve St John, St James, and Ascension	A 100% structure inventory was collected and analyzed in St. James parish. This data was used to develop the localized storm surge risk reduction measures that are part of the recommended plan. As for Ascension, benefits could have been calculated and captured there but after overlaying storm surge grids with existing topographical information, it was concluded that very little damage would occur in Ascension Parish. In places that could have been susceptible to storm surge, there are local levees (such as the Laurel Ridge Levee) that reduce risk to storm surge and from flooding of the Amite River.
PC_41549_5_Bill Roux	Submitted data from economic sources (Moody's, GIS, NED manual). Increased 19% land area, huge population increase, households, and equivalent benefits are not properly accounted for.	Comment Acknowledged, thanks for your comment.
PC_41549_6_Bill Roux	Additional data submitted to show additional affec ted areas that should be considered as part of the project area: Panama/Conway, lower part of the parish.	Comment Acknowledged, thanks for your comment.
PC_41549_7_Bill Roux	East Ascension Drainage Board and Parish Council recommend Alt D	Comment Acknowledged, thanks for your comment.
PC_41549_8_Bill Roux	Expressed belief that levees do not hurt wetlands behind them - as long as there is water interchange allowed between interior and exterior of system.	Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area.
PC_41549_9_Clint Cointment	Wetlands little impacted by levees already in place; additional levees will not indirectly impact them.	Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area. Each layer of hydraulic barrier causes a cumulative effect on the wetlands behind them. We accounted for this in the existing conditions of the wetlands and are mitigating for the value of the wetlands as they exist with full or limited access.
PC_41549_10_Clint Cointment	Saltwater intrusion through Lk Pontch and Maurepas a bigger environmental issue. Levees will benefit by preventing the SWI.	FALSE
PC_41549_11_Clint Cointment	Cost-benefit analysis questioned, as Ascension and St James residences not included in the assessment, as well as future development.	A 100% structure inventory was collected and analyzed in St. James parish. This data was used to develop the localized storm surge risk reduction measures that are part of the recommended plan. As for Ascension, benefits could have been calculated and captured there but after overlaying storm surge grids with existing topographical information, it was concluded that very little damage would occur in Ascension Parish. In places that could have been susceptible to storm surge, there are local levees (such as the Laurel Ridge Levee) that reduce risk to storm surge and from flooding of the Amite River.
PC_41549_12_Clint Cointment	No change in cost from C to D, but protection is greater for residences, structures, economics, business. Not all captured benefits.	There is an increase in cost and environmental impacts from Alternative C to Alternative D.
PC_41549_13_Clint Cointment	Protection of evacuation routes not properly captured.	A reduction in traffic delays, associated with emergency response activities following a tropical storm surge, is a potential economic benefit that can be attributable for each of the alternatives considered in this study. However, compared to the reduction in physical damages to property, this category is expected to represent a relatively small portion of total economic benefits. Also, since the computation of these benefits were not needed to confirm the economic justification of the project, the development of a regional traffic delay model needed to compute these benefits was not pursued. With respect to the use of major state and Federal highways for pre-storm evacuation, none of the plans would provide economic benefits since these routes are closed to traffic within a minimum of 24 hours prior to tropical storm landfall and cannot be used whether or not a levee system is in place.
PC_41549_14_Clint Cointment	Loss of life prevention worth the additional increment (10M is less than 1% of overall cost)	When severe weather strikes it's critical to think about your safety and your family's safety. Local emergency planning is the responsibility of the State of Louisiana and local municipalities. The USACE encourages you to listen carefully to the direction of local officials and prepare to evacuate if it becomes necessary. Only stay at home if you have NOT been ordered to evacuate by local officials. Listen to local officials and be ready to evacuate. Evacuation plans by locals should be enacted well before the occurrence of storm surges into an area. Residents could be requested to evacuate even behind a levee. The main purpose of a levee is for the protection of property not life or limb. Durations of flooding in street will be highly depended on the type of storm event. Access may be limited into areas for other reasons not related to flooding (e.g. debris, downed power lines). The State of Louisiana's Emergency Preparedness Guide states that "You should be prepared to sustain yourself and your family away from your home for several days or, in a worst-case scenario, several weeks or even months. The guide also advises that the "government agencies may not be able to react as quickly as you think they should."

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_41549_15_Kent Schexnaydre	Risk of I-10 closure, Hwy 61, and railroad. Not included costs to rail in calculations.	A reduction in traffic delays, associated with emergency response activities following a tropical storm surge, is a potential economic benefit that can be attributable for each of the alternatives considered in this study. However, compared to the reduction in physical damages to property, this category is expected to represent a relatively small portion of total economic benefits. Also, since the computation of these benefits were not needed to confirm the economic justification of the project, the development of a regional traffic delay model needed to compute these benefits was not pursued. With respect to the use of major state and Federal highways for pre-storm evacuation, none of the plans would provide economic benefits since these routes are closed to traffic within a minimum of 24 hours prior to tropical storm landfall and cannot be used whether or not a levee system is in place.
PC_41549_16_Kent Schexnaydre	Industry risks, especially indirect, is not captured well.	Impacts to pipelines were investigated in the study process but there was limited empirical data to show that there are storm damages to pipelines that are mostly buried. Impacts to pipeline facilities such as transfer stations, that have if damageable assets, were included the NED benefits.
PC_41549_17_Kent Schexnaydre	Cumulative benefits - tying into Ascension Parish system is not captured well in benefit calculations	Comment Acknowledged, thanks for your comment.
PC_41549_18_Kent Schexnaydre	Environmental impact will be less than calculated for Alt D. Interstate impacts already in place; just combined with levee impacts.	Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area. Each layer of hydraulic barrier causes a cumulative effect on the wetlands behind them. We accounted for this in the existing conditions of the wetlands and are mitigating for the value of the wetlands as they exist with full or limited access.
PC_41549_19_Kent Schexnaydre	Need to address water pumping into Miss R through Comite diversion or Blind R.	Per Corps ER-1105-2-100, the study was formulated as a Hurricane and Storm Damage Reduction study based on the two WSLP congressional resolutions. This authority allows for federal participation in studies designed to reduce damages caused by wind-generated and tide-generated waves and currents along the Nation's ocean coasts, Gulf of Mexico, Great Lakes, and estuary shores. The authority extends only that distance up-stream where the dominant causes of damage are coastal storms or ocean tidal action (or Great Lakes water motion) and wind-generated waves. The authorization does not address damages caused by stream flows from rainfall events.
PC_41549_20_Kent Schexnaydre	If Blind R pump station is prohibitively expensive, preventative measure of levee (Alt D) would be preferable.	Comment Acknowledged, thanks for your comment.
PC_41549_21_Henry Graham	Louisiana Chemical Assn facilities have access to plans for $16B in new facilities investments. Will not be protected by Alt C.	The localized storm surge risk reduction measures have been modified for the final report. The berms in the recommendation would provide additional risk reduction to infrastructure, and businesses in St. James Parish, compared the TSP
PC_41549_22_Henry Graham	Protecting the people in the corridor will have indirect impacts that are important to the nation: gasoline, plastics, fuels, critical ingredients.	The localized storm surge risk reduction measures have been modified for the final report. The berms in the recommendation would provide additional risk reduction to infrastructure, and businesses in St. James Parish, compared the TSP
PC_41549_23_Henry Graham	Transportation not protected, and risk of these costs are not included in the report.	A reduction in traffic delays, associated with emergency response activities following a tropical storm surge, is a potential economic benefit that can be attributable for each of the alternatives considered in this study. However, compared to the reduction in physical damages to property, this category is expected to represent a relatively small portion of total economic benefits. Also, since the computation of these benefits were not needed to confirm the economic justification of the project, the development of a regional traffic delay model needed to compute these benefits was not pursued. With respect to the use of major state and Federal highways for pre-storm evacuation, none of the plans would provide economic benefits since these routes are closed to traffic within a minimum of 24 hours prior to tropical storm landfall and cannot be used whether or not a levee system is in place.
PC_41549_24_Henry Graham	All costs seem to be included, but not all of the benefits captured. Alt D protects 2x people, facilities, roads and infrastructure.	The localized storm surge risk reduction measures have been modified for the final report. The berms in the recommendation would provide additional risk reduction to infrastructure, and businesses in St. James Parish, compared the TSP

Unique file Identifier**	Comment (may be paraphrased or summarized)	Final Response
PC_41549_25_Henry Graham	Master Plan for CPRA had >12 factors in decision matrix, not just B/C. Recommended D. Urge you to reconsider.	While the Corps understands that Alternative D provides risk reduction to a larger area, the Corps' recommendation has to be consistent with the Water Resources Planning Act of 1965 (Pub. L. 89-80). The Corps has to recommend a plan that reasonably maximizes net national economic development (NED) benefits while still protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As presented in Chapters 5 and 8 of the final report, Alternative C is the NED plan that maximizes net benefits consistent with protecting the Nation's environment. The Corps acknowledges that the NED plan may not fully address other Federal, State, and local concerns, such as future infrastructure impacts related to subsidence and sea level rise, the report, consistent with Pub. L. 89-80 still presents Alternative D as a plan investigated and shown to be above unity. As discussed in Chapter 3 of the main report and Planning Appendix, the Corps in response to comments related to areas vulnerable to flooding, the team further developed localized storm surge risk reduction measures that would address this concern. The final recommendation includes measures in St. James Parish that would prevent the flooding of these areas. As discussed in Chapter 3 of the Main Report and Planning Appendix, the team investigated the potential for induced flooding impacts in St. James associated with levee feature proposed in St. John the Baptist Parish. A review of surge models of with-project conditions found that increased stages ranged between .1-.2 feet of water over a 50-year period, which is within the current model uncertainty. There is always fundamental uncertainty with the modeling, but due to the limited acres of wetlands enclosed with Alternative C versus Alternative D, the potential for impacts to communities outside of the a levee area would be similar with and without Alternative C. There is a higher risk related to induced flooding associated with Alternative D due to the larger acres enclosed. Additional precision modeling will be performed during preconstruction engineering and design to precisely estimate its magnitude, but at this point, the model uncertainty and inclusion of localized storm surge risk reduction measures with Alternative C adequately addresses the limited potential for induced damages.
PC_41549_26_Monica Salins	If O/M is 100% Non-fed, then a sensitivity analysis should be done to see which is a better plan, exclusive of O&M costs. If locals will absorb O&M, then should not be a selecting function.	The Corps policy and guidelines requires all feasibility reports to disclose the full cost of operating and maintaining a federal project.
PC_41549_27_Monica Salins	Request the 'what if' scenario be done to show difference in plan construction costs.	Comment Acknowledged, thanks for your comment.
PC_41549_28_Monica Salins	If Maurepas swamp is declining to convert to open water under FWOP, what purpose does mitigation serve? Levee will protect better than FWOP, without mitigation. And credit the project with 79 miles of wetlands.	Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area. Each layer of hydraulic barrier causes a cumulative effect on the wetlands behind them. We accounted for this in the existing conditions of the wetlands and are mitigating for the value of the wetlands as they exist with full or limited access.
PC_41549_29_Monica Salins	Disagree that no-action will have no impact on community and regional growth. Simple impacts from BW-12 will be a major adverse impact to community and regional growth. Not advocating development of wetlands, but ag lands? Should be allowed to develop.	Comment Acknowledged, thanks for your comment.
PC_41549_30_Monica Salins	Disagree with indirect and cumulative impacts to the wetlands. Impacts already incurred from I-10 'levee'. Culverts do not allow passage of water, and levee would further protect fragile wetlands. Not impact them negatively.	Enclosing the wetlands behind the levee limits their value and function to aquatic species that may no longer be able to access the area. Each layer of hydraulic barrier causes a cumulative effect on the wetlands behind them. We accounted for this in the existing conditions of the wetlands and are mitigating for the value of the wetlands as they exist with full or limited access.
PC_41549_31_Monica Salins	No evidence provided that levee building will damage the wetlands. Opinion of environmental agencies, not science.	Comment Acknowledged, thanks for your comment.
PC_41549_32_Monica Salins	Counter-example: LPV, St Charles polder, cypress are bare adjacent to Lake Ponchartrain, healthy behind the St Charles levee.	Comment Acknowledged, thanks for your comment.
PC_41549_33_Monica Salins	Counterexample #2 - inside LGM levee, open water outside the levee, healthy, vibrant forested wetlands inside.	Comment Acknowledged, thanks for your comment.
PC_41549_34_Monica Salins	Risk to industry that is not accounted for. Least impact to pipelines (relocations) used to ship products across the country.	Impacts to pipelines were investigated in the study process but there was limited empirical data to show that there are storm damages to pipelines that are mostly buried. Impacts to pipeline facilities such as transfer stations that have if damageable assets, were included the NED benefits.
PC_41549_35_Monica Salins	Pipeline relocations not fully evaluated. Pipeline outage cost and loss of material cost not included. Only construction costs. Does not capture full impact of costs.	Impacts to pipelines were investigated in the study process but there was limited empirical data to show that there are storm damages to pipelines that are mostly buried. Impacts to pipeline facilities such as transfer stations that have if damageable assets, were included the NED benefits.
PC_41549_36_Monica Salins	Relocations costs borne by locals, and needs to be fully captured, to give the correct assessment of costs to the sponsor.	Relocation costs are included in the Economic analysis.
PC_41549_37_Monica Salins	Request answers to questions and all others by 30 days after the comment period - November 18, 2013.	This document provides responses to all comments.
PC_41549_38_Monica Salins	Alignment D recommended. The partnership - of equals - between local and federal depends on the Corps listening to the stakeholders.	Comment Acknowledged, thanks for your comment.

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex Q

Public Comments and Public Meeting Transcripts

***Please see Annex P to find the response to each of these comments. They can be located using the Unique File Identifier labeled on each of the documents in this annex.**

U.S. ARMY CORPS OF ENGINEERS

PUBLIC MEETING COMMENTS

****

IN RE: West Shore Lake Ponchartrain Hurricane and Storm Damage Risk Reduction Study Integrated Draft Feasibility Report and Environment Impact Statement

****

ABOVE-ENTITLED MEETING

WAS HELD ON SEPTEMBER 10, 2013, AT THE

LUTCHER HIGH SCHOOL AUDITORIUM

1910 WEST MAIN STREET

LUTCHER, LOUISIANA

MODERATOR: MR. RENE POCHE

REPORTED BY: ANNETTE ROSS, CCR, RPR

JUDY P. FOUST, INC.
CERTIFIED COURT REPORTERS
145 ST. JOSEPH STREET
BATON ROUGE, LOUISIANA 70802-5739
(225) 344-2270

APPEARANCES

PANEL MEMBERS:

Colonel Rick Hansen, Commander, Army Corps of Engineers New Orleans District

Mr. Jeff Varisco, Project Manager, WSLP

MR. Greg Miller, Branch Chief

ANNETTE ROSS, CCR NO. 93001,
Certified Court Reporter, in
And for the State of Louisiana

* * * * *

INDEX OF PUBLIC SPEAKERS

	Page
MS. KAREN DUNN	4
MR. LOUIS KLIEBERT	7
MR. TIMMY ROUSSEL	7, 46
MR. HENRY FRILOUX	8
MR. LIONEL BAILEY	9
MR. WILLY MARTIN, JR.	10, 45
MR. JUDE CAMBRE	12
MR. PAT BARKER	12
MR. THOMAS MARCANTEL	13
MR. ED PRICE	15
MS. SHELLEY DONADIEU	16

INDEX (CONT'D)

Page

MR. BARRY WAGUESPACK 17
MS. ADELE BERTHELOT 18
MR. ROBERT FOUCHEUX 19
MR. BRANDON GRAVOIS 20, 44
MR. GLENN VICKNAIR 21
MR. DENNIS TROXCLAIR 23
MR. JASON AMATO 24
MR. KURT ROUSSEL 26
MR. MAX NASSAR 28
MR. MARK ANDERSON 30
MR. KIRK DEROCHE 30
MS. DENISE NOSACKA 32
MR. ALVIN ST. PIERRE 33
MR. RYAN DONADIEU 35
MR. TERRY BORNE 37
MR. ROBERT ROUSSEL 38
MR. ROBBY LEAR 38
MR. DALTON JOHNSON 40
MR. BARRY WAGUESPACK 40
MR. WOODY POLLET 41
MS. KATY ISABEL 42
MR. PAT TREMONTE 43
MS. SHELLY WARREN 44

TRANSCRIPT OF PUBLIC COMMENTS

MS. KAREN DUNN:

First, I want to start off by, I will never look at a news story again and wonder how someone ended up in a flood zone, how did they build there.

Most people tonight are going to share their Isaac stories, but my story goes back to pre-construction. It does not take a named storm or a tropical depression to wreak havoc. All it takes is one storm to stall out over a certain area.

May 1995, there were floods. April '95, we signed a building contract and began construction on our home.

Before permits could be obtained, there was a major rain event on May 8th, 1995. Contractor was unable to start construction for an additional five to nearly six weeks, we were told the reason being the parish was busy dealing with the aftermath, that they -- we were unable to obtain a municipal address to proceed.

We found the highest point and we built above those flood markings. Once assigned, the permits were obtained, and we formed our slab on July 4th.

Heavy thunderstorms and unnamed storm flooding, that has caused issues with us in the past, the storms. Street covers over, the yard fills up, renders me unable

to use my car at times until it runs off.

Major storm issues, with Isaac flooding, along come familiar names -- Katrina, Rita, Gustav -- all causing some type of damage. New roof with Katrina and Rita. Gustav brought minor outside damages. And we lost more trees. We were lucky. For Isaac, we had some cosmetic damages. We weathered the storm.

But then comes the back flooding. With the back flooding comes sandbagging. Thank God this community came together and helped each other, they sandbagging pumping, property loss -- everybody stuck together -- none of which was covered. All of our losses were out of pocket.

My place of employment sustained damages. My business is housed in that building. I was displaced in my business for two months waiting for repairs to be finished. Because so many people were flooded, resources were short.

Personal responsibility for carrying flood insurance. It has never been mandatory for me to carry flood insurance, but I knew I could never be without flood insurance. I would never want to become a tax burden on our society. I work. I own a business. I am a contributor, and I wish to remain so.

I fear the day we are rezoned and I won't be

able to meet those premiums. My husband is a 24-year-old veteran of St. James Sheriff's Office. Residency in St. James Parish is a requirement. It's our home, and we want to stay.

The final comment --

MR. POCHE:

You have about 15 seconds.

MS. DUNN:

Okay. Elevations. I'm not fond of the elevation plan because of the cost involved. I hear that it's possible we would have to share a burden of that. And the flooding may not enter the structure, but there would be no access for emergencies. We would be either shut in or shut out, and the vehicle issues would come into play.

And then, the last part, I had some pictures of the story of the flooding, front, side, up, down the street, back street, and pumping. And then I have some elevation levels of my house where, when the river crested, that tells the whole story.

MR. POCHE:

Okay. You are submitting all that for the Corps?

MS. DUNN:

Yes. I already gave a copy. Thank you.

MR. LOUIS KLIEBERT:

I have two simple questions, and it's going to be very interesting to hear the answers that you're going to have to say.

In the town of Gramercy, with Isaac, the substation went underwater. There was no power. If the substation in Convent goes underwater, there will be no power. That means almost all, if not all, of the east bank of St. James Parish will be out of power. What are your plans to do in that if you don't build a levee?

The other one is, I passed on 61 after Isaac. They closed the road right after I passed because it was flooding. I went through flood water. And if 61 floods, the interstate floods, and 3125 floods, where are we going to pass the traffic? Thank you.

MR. TIMMY ROUSSEL:

You mentioned the bald eagle in your report when you addressed everyone. Well, you know, we have something pretty close to almost being endangered also. And it's Perique tobacco. It can't be grown anywhere else in the world, only in St. James Parish.

Perique is a type of tobacco in St. James known for its strong, powerful, and fruity aroma. When Acadians made their way into this region in 1776, the Choctaw and Chickasaw tribes were cultivating a variety

of tobacco with a distinctive flavor. A farmer named Pierre Chenet is credited with the first turning this local tobacco into what it is now known as, Perique, in 1824 through the technique of pressure fermentation.

According to William Retz (phonetic), the entire world supply of this type tobacco is grown here in St. James on an area of several hundred acres near the small communities of Grand Point, Paulina, and Belmont. This is a unique -- this is a unique agricultural crop. The production does not have an economic impact if saline storm surge waters are allowed to penetrate into the area; that crop will become history. It is imperative for this crop only grown here in St. James Parish that we can't allow that saltwater to get into the soil. Thank you.

MR. HENRY FRILOUX:

Good evening. Thank y'all very much for coming out this evening. Thank y'all for giving us the opportunity to address The Corps. My name is Henry Friloux, and I am representing the business and the industrial community of the three-parish area of St. James, St. John, and St. Charles. The River Region Chamber of Commerce represents all three of these parishes.

It is critical for the business and industrial

community that we have adequate protection to keep our businesses and the industrial facilities open and operating, continuously operating, some of them, where they don't have to shut down. A lot of times, when an industry shuts down in South Louisiana, it not only affects South Louisiana workers, but it affects workers all over the country.

But Alignment C, though it protects a lot of St. John, still leaves parts of St. John exposed and all of St. James Parish exposed. And the St. James Parish is becoming a very, very key player in the economy of this country and needs to be protected.

Also, Interstate 10, I think we brought up before, is a major evacuation route out of the New Orleans area, and protecting it is vital to making sure that we have a clear access out of this area in case of a storm. So we would consider -- we would ask you to please consider Alignment D in your evaluations.

And if you need any information, data, economic, etc., from the business community, please contact us. We would be more than happy to help you in supplying it. Thank you very much.

MR. LIONEL BAILEY:

All right. My name is Lionel Bailey. When I first walked in, I talked to Mr. Poche briefly, and I

think I kind of got under his skin, because I'm very familiar with the NEPA process. And based on that process is like being on the tail end.

The process is not designed to help you justify a decision already made. It is used to help you make informed decisions. And you guys already made a decision and want to come, I guess, on the rear end and expect to justify the decision. We strongly recommend Alternative D. Thank you.

MR. WILLY MARTIN, JR.:

Thank you. First of all, Colonel, please don't think I'm picking on you, but I want to concentrate on a few, couple of comments that were made in regards to the President making a statement about making sure this doesn't happen again. I strongly feel like, if Alignment D is not the choice, that it will happen again.

And one of the things that I learned extremely valuable is the process of the economic benefits. And we keep talking about benefits. And as I recall earlier in the evening, I asked to clarify benefits. And so some of the comments here capture those benefits.

President Roussel alluded to the unique crop of Perique tobacco. But the agricultural industry in this parish is extremely vital for us. And not only do we

affect the Perique tobacco, the sugar cane and soybeans, which is a big economic impact here.

I have been fortunate to serve this parish long enough to have dealt with every event from Andrew all the way to Isaac and every unnamed event in between. And I have seen the cost to local taxpayers in regards to just the emergency response efforts. So I don't know if we captured that factor in.

Not only the fact that we lose Interstate 10, we lose rail systems, we lose 61, I dealt with the traffic coming through Tulane, Highway 3125. I dealt with the impact that had on our local community not being able to get to the resources they needed to bring this community back to life.

So -- and I've dealt personally with the trying to recover cost from the federal level to pay for those services. So, in capturing cost, I don't know what that cost is. I would have to go back and try to get you that information.

But the lack of cost also is something we need to concentrate on, because you concentrate on figures a lot. And in the absence of claims to FEMA because of flood damages is not by lack of effort. It's because the people in this room and the people in this parish worked hard to stop flooding and protect property. And don't

punish us for our efforts.

And, last, I want to just encourage, because we are not all going to get to speak tonight and this is an emotional topic and a lot of you have a lot to say, please sit at your computers, put a lot of thought into your comments, and give The Corps what they need. They need information that they may be overlooking, that we may be forgetting. Respond by your mail. Respond by your e-mails. Put letters in the mail. And, please, I thank you for being here, for doing your part. And I trust that you are going to do it again when you get home. Thank you.

MR. JUDE CAMBRE:

I have been in this parish 75 years, and, each year, there's a storm. But the storm doesn't bring all the water. It comes in from the back.

Let me tell you people, if C option is taken, we are sunk. They need to go with "D." If they took that levee from "C" and stretched it along "D," it would come into the parish, into St. James Parish, without no additional cost. So what's up? I believe they are trying to crucify us. Thank you.

MR. PAT BARKER:

I moved into the parish six years ago, built a brand new home in a no-flood zone. And if they do "C,"

they are making me a flood zone, and that's not right.

MR. THOMAS MARCANTEL:

I'm not really supporting any of the plans, because I think I'm privy to some information that may change the scope of the whole thing. If you could, bring back that picture that you had of your plan, possibly, on the monitor.

I work for an industry, Canadian National Railroad, which is the former Illinois Central. And I do know that it's a major issue with them every time a storm comes -- name them all. Right along the lake, there's a railroad track. And, basically, that railroad industry is fed up with it being some sort of a protection levee along the lake.

Last year, in Isaac, it was washed away as in many, many other storms, the cost somewhere between $17- and $20 million to repair it. Okay?

What I'm proposing is that we think out of the box a little bit. Why can't we make a levee that doesn't impact anybody, the environment or anything else, on the lake side of Ponchartrain of that railroad track.

Collectively, and I'm here from St. John Parish, and I sense a lot of animosity from one parish to the other. You know, you're leaving me out, you're doing this, and what happens to us? And it should never, ever

be that way.

I personally think that, if we use wisdom and work together, that there's a solution. I think The Corps may not know that the industry that I worked for, for 42 years would -- I can't speak for them, but I can speak in reference to what the cause of all that is.

What I'm proposing is a levee along the lake, in conjunction with all the other parishes north of the lake get together and maybe have some kind of a lock at Manchac Pass. We have locks in the Mississippi River. It's feasible. I mean, it's proven projects that work.

We don't have to pump the water out. If there's a tidal surge, there's nowhere -- I mean, yes, you can put a pump. But you can't pump water much over the level that it is. And the tide -- in Isaac, the tide was up. And then what happened was, there was nowhere for the water to go.

You know, my yard and everybody else's right here, we nearly flooded in that subdivision we're living in. But the problem is, is that -- and I see this, that if we could just all get together. And it impacted not only the industry that I work for, but it impacted the industries up along the river. It cost hundreds of millions of dollars. I have heard my people tell us, not only did it cost them a lot of money, but it cost every

industry up and down this river was impacted.

MR. POCHE:

I need you to wrap it up.

MR. MARCANTEL:

That's it. Thank you.

MR. ED PRICE:

Thank you very much, and Thank Colonel Hansen and the staff of The Corps for being here and for what you are doing. I also want to thank the parish president and sheriff for putting this on. But most of all, I want to thank all of you all for being here tonight, because this is very important that we make a point to The Corps that Alternative D is the most feasible plan for, not just St. James Parish, but Ascension Parish, which I also represent. I represent St. James and Ascension.

And I know, on behalf of our River Parish delegation and Representative Berthelot is here tonight. I want to mention his name. I see Representative Smith is here, and they may be making a comment.

But we will work at the state level to make sure that we get the attention of our congressional delegation, as well as The Corps, and working with the Ponchartrain Levee Board and the South Louisiana Port Commission to make sure that we get the right protection for the people of St. James Parish. And we are dedicated

to that.

Our delegation will work on your behalf to make sure that that protection plan, and this is Alternative D, which we feel right now is the best alternative for this parish, that we put forth that effort and also getting funding to do that. So I thank you, and I thank all of you all for being here.

MS. SHELLEY DONADIEU:

Okay. I'm one of the residents here, and I was in an area that flooded. I read those plans that The Corps came up with. The Corps states some of the information why they're choosing Plan C had to do with the agriculture impact on St. John and also the cohesiveness of the St. John community that was impacted.

What about the cohesiveness of our community in this parish? Why isn't it enough that something is going to be done for us? You have levees that y'all are going to build in St. John. Ascension Parish has theirs. Where is all that water going to go? Right back on us.

We spent three days sandbagging down my subdivision alone. Some of my friends spent about a week pumping water out on the sandbags to get the water out to where it's not in their homes. So if we flood, we lose all of our valuables just like St. John flooded. Twenty

minutes for the water. Walked out, oh, it's a ways back. No big deal. Fifteen, twenty minutes later, it's in their homes.

Y'all talk about the marshlands being, you know, the barrier for us. The reports state that the marshlands are turning into open water. Nothing is going to slow it down for us, just like St. John. So why don't we matter enough? Yes, we're a small community. We have agriculture here. What about the cane fields here? What about Zapp's potato factory? What about the refineries? We have the sugar refineries here.

What about us, transportation throughout here? It was busier here because the roads were flooded in St. John also, so where would they travel through? Our parish. If our Parish floods, how are they going to get where they have to go?

MR. BARRY WAGUESPACK:

I live in Ascension Parish right out of Sorrento on Highway 70. I have been having my property for 13 years. In '01, Alicia came. Water came up to the slab on the house. When I built in 2000, I was not in a flood zone.

There was another storm came. I sandbagged, but no water. That was a good thing. But then Isaac came, and it was a good thing it was on a holiday weekend. I

could get some help. I put 1500 sandbags or more around my house. I had two cane field tractors running in 18 inches of water.

Now, Ascension Parish provided us filled sandbags, but they couldn't get but 100 yards from my house. So we were using cane -- high ground tractors running in 18 inches of water, pulling sandbags to the house. We saved the house. There would have been four inches of water in my house. So I want to thank all my friends that came.

It looked like every time I've had to increase the levee, it was in the middle of the night, and they all came. So I want to thank them for that. But, anyway, the old folks in that area said they have never seen that much water before. So thank you very much.

MS. ADELE BERTHELOT:

I am a homeowner in Gramercy. And, as pointed out, Plan D is the best plan. It provides protection for everyone. And it was pointed out that there is a difference of $10 million of construction cost between Plan C and Plan D.

I'd like to propose something. As a geoscientist, I am trained to think out of the box. Just down the road, Mosaic has gypsum mounds located south of 3125. The gypsum could be used as a component to mix and

create levees mixed with material that would make them impermeable and probably lower the cost. And I'm sure Mosaic would love to -- because right now it's just being stockpiled. And before that, for decades, it was just being dumped in the river.

It's not toxic. It's just NORM, natural occurring radioactive material, which is not toxic. So the gypsum could be mixed with some type of material to cause it to be impermeable. And, probably, it would lower the cost, the construction cost, of the levee. So it's just something for you to think about.

ROBERT FOUCHEUX:

(To Mr. Poche): Look, I forgive you.

(To the Panel): I have heard tonight that wildlife is more important than people. I have heard that the federal government is to be considered and not the people.

During Isaac, I lost eight properties, one in St. John and seven here in St. James. We need to stop this. We need to in fact go along with Alignment D. Alignment C will cause more water to come into our parish. This Corps of Engineers should also look at building a damn or building a gate at the Rigolets.

The proposal that y'all have would be a taking and violate Article V of the Constitution of the United

States. The Corps makes up a part of The United States. You are not an entity that does not have to serve the people. So please consider everything that's been said tonight and work for our parish.

BRANDON GRAVOIS:

I'd like to thank everybody for coming out here tonight. Well, I'm a fourth generation sugar cane farmer, and we pay attention to the weather most importantly than anything. And we always get rain throughout the year, and 56 inches of rain a year, most case average.

Well, last year we was up to 70 inches of rain. In the week before Hurricane Isaac, we received 12 inches of rain. During the storm, we received another 12 inches of rain a week later. So all our canals, bayous, ditches, drains were filled with water. After the storm, our water receded. All the fields was empty, and everything drained out. Every house was safe.

However, on the third day, fourth day, the water started coming back in with mammoth amount of water out from north of the lake. Our community pulled together really strong. All of our work crew started filling sandbags. Everybody in the parish came together and we fought this tremendous disaster and we saved a lot of homes.

So, and with that, I mean, we need -- in our sandbagging process, Highway 61 was closed, Interstate 10 was closed, so all this traffic started rerouting through 3125. And that created a traffic jam. We couldn't get trucks in with the sand. We couldn't get sandbags to the houses that needed it. So, with this, all these routes being closed, it became even monstrous for us that we came together and fought this. So we would like to go with Alternative D or something that kind of restricts the waters.

Also, I would like to say that Highway 61 has four tunnels or four culverts with one big bridge, that if we wouldn't have had 61, we would have been like St. John. It only allowed us to get a quarter-inch an hour. And we made, a couple of boys from us in Grand Point, a couple boys with the fire department, at the boat launch in the boat club, made our own gauges and we were relaying to the parish and to whoever was around, to continue to fill the sandbags and monitor the water as it come up. So consider that in your options as well. Thank you.

MR. GLENN VICKNAIR:

I was looking up Article V on my iPhone. Thank y'all for coming here. And I didn't get it, because the WiFi wasn't connected. But thank y'all for coming here

and hearing our voices.

You know, we learn from mistakes, unfortunately, in the world we live in. I know New Orleans had a lot of flooding. Some levees were built. You know, just in casual conversation with friends, we know the water's got to go somewhere. Right? Where does it go? St. John. If you do Alignment C, the water is going to go somewhere. Where is it going to go? St. James.

So it's coming. And we got you -- you know, we want you to make a good decision, Alignment D naturally. But, unfortunately, the last storm we had, first time I have been living back in David Plantation in 14 years, we had the water come up, sandbags around homes. Right? Fortunately, no water got in. The levee is built for Alignment C, it's going to happen. It's a matter of time.

I know you talked about lifting homes, homes, rates, flood insurance premiums go up. We hear it going on all over.

Wildlife, talk about that, the Environmental Act, that's fine. Right? Fishing was never good down Blind River. Sacrifices -- I'm being serious. Sacrifices got to be made, but it's not the people. Wildlife is the sacrifice that's got to be, you know, taken for this hit, for this brunt.

So we ask you to keep working with the government, our local government, state government, and make a very good conscious decision on going with Alignment D. The money, the funds, are there. We heard earlier, the President said let's not let this happen again. So please make a very good decision. Thank you.

DENNIS TROXCLAIR:

Thank you. As we look at this audience, we see everybody here is concerned. It affects every single one of us. Many of the concerns I had have been brought up already: to go underwater, I-10 has no access, 61, 3125. And, if bad enough, everything has to be diverted through River Road. You don't ever want to see that.

The biggest concern I have is, this is a community. We grew up together. We live together. Our children grew up here. We love this community. It will take $10 million to extend the levee, and we talked about elevating 1500 homes. I talked to someone. They say it's about $30,000 per home to elevate a house. If you multiply that times 1500 houses, that's $45 million. So if it's 45 million to elevate houses and it's 10 million to extend it, something doesn't add up.

And St. James is really a growing community. You look around, and houses are being built everywhere. I'm sure everybody read in the newspaper about all these

flood zones have been redone. And I read this, and it's not $2,000. They say some areas, it's going to be 2,000 percent. Nobody in this area can afford a 2,000 percent increase in flood insurance.

If you're going to build in this area and you borrow money from the bank, you're going to have to have flood insurance. These poor people that's paying on this house already, if that insurance goes up drastically, they are going to have to sell. But who's going to buy it? They're stuck. And who is going to want to build in this area that we love if you're going to take all this water and send our way? It just doesn't make sense.

The people in St. John, St. Charles, yes, they're important just like everyone in this room right here. We're all important. We love this area. Don't leave us out. Please consider Proposal D.

JASON AMATO:

Good evening, everybody. Colonel Hansen, thank you for your team coming down. When we talk about it, for me, District 2, every home north of 3125 in my district was sandbagged last time, Hurricane Isaac and all.

We talked about Alignment C. And when you talk about the nonstructural component, in my opinion, that's a nonstarter. I guarantee you, if I walk down this here

street and tell them, all the residents, we're not going to build a levee, I'm going to raise your home four foot high, I would be lucky to get out of there before it's going to be four foot deep.

So it's really isn't all about the benefits and cost and all that. I think the cost side is easy when you look about maintenance on the levee and all. I really think it's a chance for all of us just to put a dollar figure on the benefits, you know. How do you -- you need to put a dollar figure on the benefit of our interstate system and highways staying open. I think we need to put a dollar figure on the benefits of our industry and the railroad system staying open. I think we really need to work on putting a benefit on what it costs. If you remember back in Hurricane Katrina, when we tried to take care of all those poor residents who were locked out of their homes because of the floodwater. Put a cost benefit on that. But you have to try. And that's where your heart needs to come into play on that one. That's where we are going to challenge you on that one.

You know, if you think back, President Eisenhower authorized the Federal Aid Highway Act of 1956 which established a program of funding and building of our interstate systems. He saw the value for civilian

needs, support for economic development, and improved highway safety. But he also understood the military value of the interstate system, as well as its use for evacuations.

So the answer I'm getting after tonight is pretty simple. It's either Plan D from you or it's Plan B from us. Thank you.

MR. KURT ROUSSEL:

To start off with, everybody here is hard-working tax-paying Americans, and we're not asking for hand-outs. We're not that kind of community. The community banded together. We fought the flood waters of Isaac.

You know, sometimes it makes you scratch your head, we get into this. We should take a big bill to federal government, and maybe we would be looking at Alignment D. We would be sticking with that.

You know, it's the first time we ever had people evacuate to New Orleans for a hurricane. That's the first time in history. You know, the older people -- you start off with Diversion Canal. You talk to the older people in the '60s, when they the dug the Diversion Canal, they dug it on an angle and started to pull some water. Whenever Baton Rouge, Livingston Parish get all the water, three days later, the water starts backing up

and runs through Blind River. We think it should have been dug straight to the lake and not dug onto Blind River the way it is, because the backwater gets us all the time.

Besides, the City-Parish put a fifth pump on. If we raise the houses in our parish, we're going to have new houses to protect. So we really need to go with Alignment D.

Now, for the gentleman in St. John Parish, when St. John went underwater, guess who came to their aid: St. James Parish. There's no animosity between the parishes. We all need to stick together.

So after we sent rescue boats down there, just like we did for Hurricane Katrina, we sent rescue boats down for Hurricane Katrina. Every time there's a hurricane, we're always looking to help people. That's why our houses stayed as safe as they were.

Two days after St. John's water went down, I called the fire chief down there and asked him how they were making out. He said they lost eight inches of water. Guess what: We got eight inches of water. The water they lost, we got. So if we don't go to Alignment D, we're going to be a retention pond, St. James Parish Retention Pond. That's all we're going to be. Thank you.

MR. MAX NASSAR:

I heard some people do know how to pronounce my last name.

I don't have as good a memory as some other people in the audience, so I jotted some notes during the conversations. One thing that I would be interested, and I haven't read the draft report, and I'm assuming that we're somewhere between the DEIS and the FEIS in this process. Would that be right? Okay. You don't need to answer.

I would be interested in looking to see or knowing what the purpose and need is of this project relative to the NEPA process. My assumption is going to be that it's to provide hurricane protection for more than just St. John Parish.

Secondly, the NEPA process, what it calls for is for you to choose the least damaging, yet practical alternative, with cost only being one of the considerations. It seems to me, in looking at some of the figures and some of the illustrations I have seen, that cost is virtually your only consideration as opposed to being one of the considerations.

Your analysis relative to the cost of the project should also include the cost to the residents and property owners and industries and families in St. James

Parish. That is also a cost. That is a cost of we, the people.

Alternate D, the impact as identified, one of the impacts identified is the impact to the Blind River Diversion Project which hasn't even begun to be built yet. That project has just finished the EIS also, and there is no reason why -- or, actually, the NEPA process allows you to open that EIS and do a modification to that EIS so that the two projects, the levee project and the Blind River Diversion Project, could actually work in tandem and be evaluated in tandem. NEPA allows for that, and there is no reason why that shouldn't be done.

In Hurricane Isaac, just like in St. John, there was water in areas in St. James Parish that had never received water before. And that water in some cases was on the river side of 3125, which puts it in very close proximity to a number of very large industrial and chemical plants that are, as someone said earlier, that are critical to the economy and the safety and well-being of The United States.

We saw some years ago in Norco, when the Cat Cracker at Shell exploded, that the gasoline prices across the country shot up and there was a major shortage of that chemical. The industries in St. James Parish and in St. James Parish and in St. Charles Parish need to be

protected for the safety and security of The United States of America. And I think that that's all I have to say, except that I support Alternative D.

MR. MARK ANDERSON:

Colonel Hansen, we are not relatives, I know. Mr. Poche, some people call me Mr. Poche sometimes too incorrectly.

I'm going to tell you, I'm going to use relatives a little bit. Neighbors don't flood neighbors. St. John passed a resolution saying they wanted "D." I believe Ascension did the same. The surrounding parishes, they are not against going with "D." Our people help out our parish from both east and west, north and south.

What we're asking Mr. Poche to do here, since Mr. Poche is a relative of some sort, if we don't flood our roots, you know, so maybe you can get with Colonel Hansen and tell him your roots came from St. James Parish and they ain't going to be flooded.

We want "D" on the board, so keep it on the board. Don't take it off the board. Make it happen. Thank You.

MR. KIRK DEROCHE:

All right. Good evening. Thank you for hearing us. We're hearing that "D" is a little more costly than

the rest of them. By far, that would be the best option, and it would keep all the plants in this area running. We have got a major oil refinery in Convent. I haven't worked there.

But, anyways, I don't know what we are building or how we are building the levee, but if we will build a canal on the other side, go a mile or a half-mile away from the interstate, because I've got a camp not far from there on the back side. Went down there after Isaac. The interstate is basically attached to a levee now. That water would drop about a good 18 inches or so from the lake side coming to this side, coming in.

If we were to put Alignment D in, dig a canal from Ascension Parish all the way to 51 out there, or even put locks on the other side so they could drain freshwater in the Shell Beach area out there and help save some trees over there, do the environment.

Wildlife, we were talking about. We would help enhance that. We can actually get a circulation. He is talking about the freshwater diversion. That would help us. At one time we did catch a lot of fish back there, but, again, now it's just a acidy pit for decaying trees and stuff.

But if we dug a canal on the other side of Alignment D, put the lock like we are talking about, it

would enhance drainage for Ascension, St. James, and St. John Parish. And we could still have this side for our animals. The swampland would be a buffer zone from Baton Rouge all the way down.

So, the cost, you're looking at, you know, so many people versus -- you know, like y'all did in St. John Parish: just choose "C." I mean, we affect Baton Rouge draining as well. And it can only help everybody out with Alignment D. Thank you.

DENISE NOSACKA:

Okay. I came here. I have already e-mailed The Corps saying I supported Alignment D. I think everybody here knows we are not scientists, but we know water has to go somewhere and it's going to come here and it's going to come quicker.

The only thing I wanted to bring up is that people were talking about roadways in and out and things like that. And we have plants here, like several plants everywhere from Gonzales to, you know, St. Charles. And most, like me and my husband, works at one. And when a storm comes -- I think a lot of people here from this community work there -- they're stuck there. They lock in the plants. So what happens to all of the women and the families at home?

I'm home with my family and my kids trying to

figure out how we are going to get a generator and what we're going to do. And here I am last year, with my seven-year-old kid, going make sandbags in Paulina to try to help all of these people who came together.

I think the sheriff has said a point that, don't punish us because we didn't have claims, because we worked together, because we had tons of seven-year-old kids there at Paulina filling sandbags. We worked to do this. And we did it without husbands because they were stuck at work.

And a lot of y'all here work at plants. Y'all know what it's like. They are going out when a storm is passing, and they don't want to shut down now. And if the water is here, it's going to get shut down. And somebody else said, you know, after I decided to talk, that, yes, that's going to cost the country money, you know, because they are going to stop. They are going to not be able to run the way they would normally do.

That's it, anyway, last minute.

MR. ALVIN ST. PIERRE:

I just wanted to make a few comments. Most of them were made tonight. What the Corps is really looking for was that. Okay? Mr. Donadieu, I don't know if he is coming up tonight and talk, but he is getting a lot of data together. You probably read about it in the local

paper as far as giving your elevations and such that was compared to satellite data a long time ago.

There are some things you cannot put on a piece of paper that's been discussed tonight, and that's the way this community works together. There's data that came out that said that seventh graders were doing sandbags, that people were at work trying to keep their industry running. What you're going to lose across the nation because a unit went down, or the railroad risk is another thing. You can't get the product in.

I'll give you a quick story. I had to go to Gonzales on 44. I recalled a little store right there on 44, and I went to get a generator for someone. And a lot of people from New Orleans were there, and they couldn't get through. 61 was jammed up. They didn't know anything about River Road. And, of course, the interstate was locked.

So I made a comment that I could get them out. And I was the most popular person ever around at the time, because I got them to the Sunshine Bridge, got them across the river to 3127 so they could get to New Orleans. And, actually, I gave them my phone number, told them, in case they would have some issues. And, believe it or not, I guess there was 13 people that went across, and I bet you 7 of them called and thanked me for

getting them back home to New Orleans. So that goes to show you that it was jammed up big-time.

I mean, I saw it myself. Gramercy got flooded. I have never seen that before in my life as far as the Sportsman Pond. And you've got to look: These people pumped water for three to four days to keep the water out of their houses, and a lot of you in here did the same thing.

So the data that The Corps is trying to get, we're going to give them as much as we can. But the data we cannot give them is what went on after Isaac. That's impossible.

But keep sending your comments, please. Get on the Internet. Get the cards or get a copy of the cards, whatever you can do. Keep pounding on the doorway. We have congressional. We have state. Of course, the local officials are doing the same thing. Please keep going. Don't think this is the end of it. We've got to keep on, keep them -- to get Alignment D for St. James Parish. Thank you.

MR. RYAN DONADIEU:

One of the numbers that we were talking today about was the cost of elevating a home. Y'all have 300 million set aside for that, 1571 homes. I called about four different companies and found an average.

Average cost of a 2500 square foot home is $160,000 to raise one. You are looking at 256 million. So, yeah, that falls into your range of 300 million. That's if you do them all right now, immediately.

U.S. Bureau of Labor Statistics, cost of inflation, if you put that number in and you forward, from the last 25 years, you're looking at $300,000 a house within 25 years, according to inflation. So we know the cost of everything is rising. Bread was five cents at one time, right? So you know it's going to cost more in a few years, and you're not going to get them all done now. So I think your figures are a little bit too small.

You said a half-billion dollar difference in maintenance on a $10 million difference in projects. We're going to do the maintenance. That shouldn't even be applied in my eyes. $300 million of structural raisings brings a half-billion dollar accounting down to 200 million. Over 50 years, so you're looking to have 4, maybe. So your numbers keep shrinking.

As far as the wetlands, saltwater encroachment is killing our swamps, that's one of your problems that you're saying. You are worried about the wetlands being destroyed by the levee. Saltwater encroachment, in your own report, says our swamps are going away, turning into

marsh. This levee would stop it. It would protect it.

We have the Hope Canal. We have the diversion, freshwater diversion. It would keep our swamps with nutrients, with fresh water. The levee would protect it.

In your report, it says the sea level is going to rise 2.32 feet over the next 50 years. Our swamp is going to be under saltwater. We are going to lose it if we don't protect it. So right now let's protect it. I've got to say our forefathers fought for us. They used to swim in the mud. They built the levee along the Mississippi River.

They knew we had something here, one of the largest ports from Baton Rouge to New Orleans. We're the largest one in the western hemisphere. They knew we had something to fight for. Right now we have something to fight for. We have a levee on one side. We need a levee on the other side.

MR. TERRY BORNE

I kind of like the name. I'm the mayor of Gramercy, and I want to speak from the human side a little bit. You know, we talked about cost benefits and those things.

And I thought I was doing a pretty good job as the mayor of Gramercy. I was there about a year, and along comes Isaac. And we lose about 15 houses and put

about a foot of water in them. And it was devastating for me to see young children being evacuated.

If we don't get Alignment D, it's only going to be worse. It was something I'm still not over. We would appreciate that you consider "D." Thank you.

MR. ROBERT ROUSSEL:

I would like to make a comment for the record. I'm Robert Roussel. I worked in the refinery for 40 years. And, in 2005, when Katrina hit, the refineries in this area went down. And for our cost analysis, we got a call from D.C., Department of Energy: What will it take to get these refineries back on line as soon as possible?

Well, the answer is Alignment D. We couldn't get people in the refinery to get it started, because Interstate 12 -- I mean, 10 was emergency only. Every highway was down. So, hey, that's a big cost if you look at the cost of energy to the country and what it takes to start one of these big refineries up. Thank you.

MR. ROBBY LEAR:

Thank you guys for being here. My name is Robby Lear. I am a professional civil engineer. I have done many NEPA documents on your side of the table as well as this side. I understand your process, how it goes about.

My questions, I have two questions. Your screening process that was included in your Appendix K listed 12 plans of action. Those 12 plans all had references back to previous studies ranging from the mid '80s to 2007. Nothing was addressed from lessons learned after Gustav, Isaac. All of it occurred after those planning documents. Why was there no additional plan of action entered taking into those lessons learned?

I think you need to go back and look at some of your alternatives. And A, C, and D were broken out of those plans as structural, nonstructural elements. You had a letter from the U.S. Fish and Wildlife dated October of 2012 that offered two additional alternatives of which the document does not mention other than in that letter. Why were those not vetted any further within your document and within your plan document? I would like to find out what that information holds.

Most of those alternatives decreased the wetland impacts to the Maurepas swamp from 56,000 acres down to 13,000 acres. To put that in dollars, that's over $200 million. We went from 890 million to 650 million for a makeshift Alternative D, if you will, same protection for this community, less cost to the environmental impacts, two additional model that which is known costs. I strongly encourage you to go back to your

books and look at those alternatives.

My second question is storm surge modeling. You made a small mention in your engineering document in Appendix B. It seems to me that that was only done to determine levee heights for each alternative. It did not include predevelopment and post-development flooding for each alternative.

If you build "A," does that flood go up? If you build "B," does that level go up? If you build "C" and "D," these should have zero, because it gives you full protection. I think that's what everybody -- you have passionately heard what these people are expecting, something with "D."

"C," I would love to see that storm surge model and to see, if a 7-foot levee, a 9-foot levee becomes 13, 14, what does that do to this community. Thank you.

MR. DALTON JOHNSON:

My name is Dalton Johnson. From what I can understand, you are asking to take our taxpayers' dollars from St. James and build a flood protection wall in St. John. And here in St. James, our taxpayer dollars will be to give us a flood area. I don't think that's right. You are asking us to protect somebody else and not protect ourselves with our tax dollars.

MR. BARRY WAGUESPACK:

Barry Waguespack. I live in Sorrento. We were sandbagging my house for three days. I saved my house from getting four inches of water over the floor. Since then, this last March, I built a wall around my house. It's four feet concrete away from the house, a one-foot footing, three blocks high, and a two-inch cap. The masonry work, $25,000.

By the time I got the channels in the -- I got a six-foot opening in the front and the back and a generator and a pump. Well, that wall is about a $30,000 investment. And the thing about the wall versus raising the house, you had to be there to close the gate. Thank you.

MR. WOODY POLLET:

My name is Woody Pollet. I'm going to use my experience. I was sick. Four days before Katrina hit, I was in New Orleans for my first chemo treatment, took my chemo treatment, came home. Four days later, Katrina hit. I was at my house. And, of course, everybody knows what Katrina -- Ochsner's shut down. They moved everything to Baton Rouge.

And, three weeks later, I had to do another chemo. Well, we didn't have the phones, but my wife was able to drive me to Baton Rouge. I was able to get my chemo. I didn't miss it. But what happens if we don't

build "D" and we are closed in and we can't get out?

We'd have to -- I think, during the last little storm we had, St. James Parish hospital, I think, was the only hospital open between Baton Rouge and New Orleans serving the people. What happens if we can't -- the hospital floods and we can't even get to the hospital or we can't get out? The elderly people and/or sick people are going to be in a lot of trouble. Please consider that. Thank you.

MS. KATY ISABEL:

Hello. My name is Katy Isabel, and, being an accountant, I get numbers fed back, and I don't think anybody in here would disagree with me.

But I am looking at more of a personal standpoint, besides just the numbers. I'm looking at U.S. Army Corps of Engineers. The last I checked, the U.S. Army was meant to protect the people of The United States. We are those people of The United States, so I think we should get that same protection as anybody else. There doesn't have to be a war across the seas for us to matter here.

And, lastly, as a community, we are coming here as a family. We are here to protect one another, and not just our family, but our neighbors. I'm sure most of y'all aren't here from Louisiana or only come from here.

But if this was y'all's situation and if somebody was coming at y'all to potentially destroy your family, I know y'all would do everything y'all could to protect your family. So we're asking y'all to do the same and choose Alignment D.

PAT TREMONTE:

My name is Pat Tremonte. A couple of guys out here worked in refineries, talked about what happened during the storms and everything. My partner over here, he worked with me at Shell, and we saw some water do a lot of damage. I heard this man over here talk about the railroad and the damage that was done because of the water.

I remember, when I was young, I used to hunt in the swamp along Lake Ponchartrain. There is nothing there but dead wood now. Everywhere you go around any one of the lakes, it's dead wood. Now we are starting to see it on television with the Swamp People and everything else that we got nothing but dead swamp around. I kind of believe this man over here knows what he's talking about. Surround the lakes, stop the water that's causing damage to our swamps.

The same thing going on all the way down the river, point -- what you call it -- Pilot Town down there. It's washed-out marsh. I'd like you to vote for

us, please. That's all I've got to say.

MS. SHELLY WARREN:

Good evening. My name is Shelly Warren, and I am a resident of Gramercy. Two or three months ago, you all came in. We were at the KC. And, the residents, we were here, but we were not as large as we are tonight. At that time, two or three months ago, you all presented to us Alternative C. But the residents spoke and asked that you all would go back and consider the Alternative D to protect St. James Parish.

And my understanding here tonight, did you all really look into Alternative D? I didn't think you did, because if you had looked into Alternative D, you all would have came back tonight to protect St. James Parish residents.

MR. BRANDON GRAVOIS:

Well, I sit on the -- to add onto my three minutes, I sit on the Coastal Zoning Board for the parish. They came in with a permit last month about another diversion project in Garyville that will take out New Hope Canal. And, according to your alignment, it will join Alignment C., and so some of that levee is going to join with some of y'all'S levee; is that correct? And then they were talking about another diversion canal in the Romeville area.

Well, these diversion canals, each of those will produce separately 2200 cubic feet per second. Now, how will we fight more water at that kind of rate to continue to keep these swamps full? Yes, they will keep our more fish with more oxygen and trees and the whatever to keep alive; however, what about the water, the more continuous flow of water through these times in need that this parish is continually fighting for?

I mean, I understand that maybe on a dry year, maybe, keep the water coming. But maybe whenever the hurricanes and our wet years, we are already full of water. That's something we have to think about as well. So keep that in mind.

WILLY MARTIN, JR.:

I want to make one more point. I think some of it may have been covered in some of the last speakers. But one of the terms I recall learning in this process is "induced" damages, an "induced" effect. And I want to just allude back to our earlier meeting last week where I think I may requested how we come about that figure. And because of the time line that you guys were working in and being in a position to try to condense all this information, yet really have a good figure to say you have a price tag, because, first of all, we don't really know the effect of the induced flooding because of a new

levee that stops in Garyville.

We also don't know the effect of road closures that weren't closed. We were only down to three in St. James Parish, two-lane roads. You can be down to less than that.

And the work force, I'd scan this audience here and say there are probably three-quarters of the people here who have family members who work in the industry far beyond the bounds of St. James Parish.

And the effects of industry and the economic impact on industry throughout the nation as a result of refineries having issues because workers can't get to their workplaces, along with the effect of commerce in general in this area because of what we lost in favor of protecting our highways. Thank you.

MR. TIMMY ROUSSEL:

Thank you, Mr. Poche. Oh, okay.

Colonel, Colonel Hansen, I respectfully request that we possibly have another public hearing before the report is finalized towards a small public review period. You heard there's a big concern here tonight. We're going to continue to work on finding even more data to add to what you have and, hopefully, data that can affect that final decision.

Again, I want to thank y'all very much for

coming here tonight, allowing us to do this and, for sure, to all the residents of St. James Parish, thank y'all very much. It makes entirely a different perception when this many people come out versus 50 from the last time. But, again, Colonel, thank y'all. Thank y'all very much.

(End of proceedings.)

C E R T I F I C A T E

I, Annette Ross, Certified Shorthand Reporter in and for the State of Louisiana, as the Officer before whom this testimony was taken, do hereby certify:

That the proceedings as herein before set forth in the foregoing 47 pages was reported by me in stenographic machine shorthand, transcribed by me or under my personal direction and supervision, and is a true and correct transcript to the best of my ability and understanding;

That I am not of counsel, nor related to any person participating in this cause, and am in no way interested in the outcome of this event;

That the transcript has been prepared in compliance with the transcript format guidelines required by statute and by rules of the board;

That I have acted in compliance with the prohibition on contractual relationships as defined by Louisiana Code of Civil Procedure Article 1434 and in rules and advisory opinions of the board.

This certification is valid only for a transcript accompanied by my original signature and original blue stamp on this page.

_____

ANNETTE ROSS,

CCR NO. 93001

16th day of September, 2013

U.S. ARMY CORPS OF ENGINEERS

PUBLIC MEETING COMMENTS

****

IN RE: West Shore Lake Ponchartrain Hurricane and Storm Damage Risk Reduction Study Integrated Draft Feasibility Report and Environment Impact Statement

****

ABOVE-ENTITLED MEETING
WAS HELD ON SEPTEMBER 17, 2013, AT THE
ST. JOHN PARISH COMMUNITY CENTER
2900 HIGHWAY 51
LAPLACE, LOUISIANA

MODERATOR: MR. RENE POCHE

REPORTED BY: ANNETTE ROSS, CCR, RPR

JUDY P. FOUST, INC.
CERTIFIED COURT REPORTERS
145 ST. JOSEPH STREET
BATON ROUGE, LOUISIANA 70802-5739
(225) 344-2270

APPEARANCES

PANEL MEMBERS:

Colonel Rick Hansen, Commander, Army Corps of Engineers New Orleans District

Mr. Jeff Varisco, Project Manager, WSLP

Mr. Greg Miller, Branch Chief

ANNETTE ROSS, CCR NO. 93001,
Certified Court Reporter, in
And for the State of Louisiana

* * * * *

INDEX OF PUBLIC SPEAKERS

	Page
MR. V.J. ST. PIERRE	4
MR. KURT ROUSSEL	6
MR. GREGORY MILLER	8
MR. RICKY DELATTE	11
MS. RUBY WHITE	12
MR. JIMMY BRAZAN	13
MR. PAUL BAIR	16
MR. SCOTT EUSTIS	17
MR. TONY SCHEXNAYDER	19, 36
DR. ANNROSE GUARINO	23
MR. REYNOLD HERNANDEZ	24
MR. WAYNE NAQUIN	26
MS. LATONYA CRESSY	26
MR. MIKE SHARPE	27
MS. DINA MARTIN	28
MR. ARTHUR JONES	29
MS. SYLVIA DUNN	30
MR. JAMES STEPHENS	30
MR. EVERETT POWELL	31
MS. NATALIE ROBOTTOM	33
MR. ANTHONY WAGUESPACK	34
MR. STEVE WILSON	35

* * * * *

TRANSCRIPT OF PUBLIC COMMENTS

MR. V.J. ST. PIERRE:

Thank you, Rene and Colonel. Thank you for allowing us to have this comment period. A lot of people don't know, but Colonel Hansen is the new guy on the block. I met with him when he first came here. He came to my office. He seems like a fine gentleman, a good family man, and I'm sure he's going to pick Alignment D.

Right, Colonel? Thank you.

I am encouraged to see the much-needed and long-authorized project moving forward in a concrete way, especially with the Willowridge Phase of the St. Charles Parish West Bank Levee currently being in bid. This is welcome news for the residents of Montz, another piece of the puzzle in providing comprehensive storm protection for all our residents.

That being said, I am very disappointed that Alignment D is not -- at the time I wrote it, Colonel, I understand it was Alignment C. So I am very disappointed that Alignment D wasn't chosen from the very start. It would offer structural protection to all the three River Parishes, including St. James. St. Charles is afforded protection in all three alignments currently under consideration by The Corps. And we look forward to this project moving forward.

However, I want to make it perfectly clear, we fully support Alignment D to allow our neighbors to the west in St. James to be afforded the protection we all deserve. I don't want it to happen in St. James what happened in St. Charles Parish when Jefferson Parish Levee District extended the western vicinity of the levee to Davis Diversion Project and aimed it in our parish and the left the rest of the east bank of St. Charles Parish open to hurricane flooding.

The $10 million difference in price between the two alignments is minor compared to the overall cost and the actual impact. We fully understand that a larger number of acreage contained within Alignment D than the other alignments; however, we would argue that, due to the saltwater intrusion, the wetlands inside the levee protection are actually held there and provide a greater long-lasting term benefit to the environment than the wetlands would if left to the eventual erosion and deterioration caused by the saltwater intrusion.

Getting these flood projects -- getting these flood protection projects built is key to protecting the lives and property of the residents and businesses located in this region and even more important now that our residents are facing astronomical premium increases in flood insurance as a result of the Biggert-Waters Act.

Finally, I would ask The Corps to consider splitting the project into two phases, allowing the first phase to move forward in construction while alignment of Phase 2 is under review. This would provide flood protection for residents in St. Charles and St. John parishes and keep evacuation routes in I-10 and I-59 open before, during, and after the storm.

Gentleman, we studied this project, we analyzed it, we modeled it. Colonel, it's time to start building it. Thank you.

MR. KURT ROUSSEL:

Good evening. I just want to start off by saying I'm the local fire chief in St. James Parish. St. John, y'all definitely need a levee. We saw it firsthand. When the hurricane Isaac came through, they called for manpower from St. James. We assembled and mobilized dozens of boats and manpower to give y'all a hand. We want to be good neighbors. And we've got a lot of relatives in St. John Parish, and y'all definitely do need a levee.

Two days after that, after the water went down in St. John, I was talking to one of the local fire chiefs. He said he went down eight inches. Well, guess what: It came up on us six inches the same day.

So we're here for a benefit/cost ratio. So I've got

a little bit more information than I did last week.

One of the responsibilities of the Paulina Grand Point Belmont Volunteer Fire Department, we have an Emergency Response Plan for Waterford 3. A lot of things have to be in place for Waterford 3 to crank up a nuclear plant after a storm. One of the things in place is, they have to have an emergency worker decontamination area. And we are the area for Waterford 3.

When Hurricane Isaac hit, Jackson, Mississippi, kept calling us, wanted to know if we had power back on, restored to our station, because, according to the federal government's plan, we had to have our station active, ready to work so they could crank Waterford 3 up. So I don't know if that was taken into the cost analysis.

One other statement I wanted to make is, what about the refineries? Motiva Convent is real, real, real, real close. It wouldn't have took a whole lot more to shut that down. What would be the effect, if Motiva Convent shut down, to the U.S. economy? I'm not sure if that was a factor in there also.

Another comment was made, brought up, is, I work in a chemical plant, been there 22 years. And chemical plants run fine as long as they're running. You go to idle them or shut them down, that's when you start having

trouble. What about the safety of industry if we had to idle them down or shut them down during a storm? Thank you.

MR. GREGORY MILLER:

Thank you. I wanted to first thank you for allowing us to speak.

I also wanted to say that Senator Gary Smith, although he could not be here, he wanted me to make sure that everyone knows that we are working together on this. We are a unified front. I know I can speak for the entire delegation of the Louisiana Legislature for the River Parishes in the River Region that we are unified in this front.

Colonel Hansen, I want to thank. I am thankful to you and your staff that, 40 years after Congress enacted the legislation requesting the opportunity to review a chief report, we finally have an Integrated Draft Feasibility Report Environmental Impact Statement, which is a vital step in getting hurricane protection for this area. We know and appreciate the hard work that went into this draft report. We appreciate the Corps's calling a public meeting to give the people in our community the opportunity to address their concerns.

Chief among the concerns with the tentative selected plan of Alternative C is that it would not provide

adequate protection to all of the communities in the study area as well as significant parts of Ascension Parish. I'm asking that the Corps of Engineers recommend Alternative D, which, at a cost -- is only a cost of $10 million more. And that would address these concerns.

The entire region needs to be protected because of the vital role in the economic security to our country provided by our petrochemical industry; the Port of South Louisiana; U.S. Highway 61, Airline Highway; Interstate 10, and, most importantly, the people who live in our communities. Alternative C would leave vulnerable vital routes that are essential for all of the South Shore of Lake Ponchartrain and the River Region, including New Orleans, for evacuation, recovery, and supplying our businesses to keep our industry operating and our citizens working. The only major highways leading west out of New Orleans would be left unprotected by this plan.

While the people of this area are mindful of environmental concerns, the hardwood swamps have protected the people of this community and served as a buffer from storm surge since our relatives first settled the German Coast almost 300 years ago. And, without any levees, these swamps and the protection they provide are

already disappearing. The best way to preserve these hardwood swamps is to encapsulate these wetlands, which will protect them from further degradation as a result of saltwater intrusion.

Among many things that the draft report failed to consider in recommending Alternative C are post-2007 events, such as the flooding from Hurricane Isaac in this community in 2012; also, the post-construction effects of an Alternative C Alignment on our communities outside of the protected area and the resulting increased costs of nonstructural measures in those communities outside of the protected area.

I fully support the locally preferred Alignment D alternative contained in the study. And this alignment would be in the best interests of Ascension Parish, St. James Parish, St. John Parish, and St. Charles Parish; indeed, the entire region, including New Orleans. Please strongly consider recommending Alternative D.

Our communities want the comprehensive protection that Alternative D will provide, and they have agreed to bear any increased cost of maintaining this alignment. The benefits of having the protection provided by Alternative D will ultimately prove to outweigh any possible increased costs. Any favorable consideration in

support of Alternative D that The Corps can give would be greatly appreciated. Thank you.

MR. RICKY DELATTE:

Could you put the picture back up that shows part of Lake Ponchartrain and all the -- that one. Okay. You're talking about your Plan C and Plan D ability to help. Plan C will cover most of St. John Parish. Plan D will go into St. James Parish.

But the only thing you're doing about which way you're going is just moving the water to a different location. You still have all of Blind River and all its tributaries that which way their waters will flow.

If you take, along the railroad tracks right along the western bank of Lake Ponchartrain that runs all the way into St. Tammany -- I mean, Tangipahoa Parish, you only have to build two sets of locks and two pumping stations, and you would cover all of Lake Maurepas and all of the surrounding tributaries around. To me, that would be a whole lot cheaper than building a levee to cover St. John; then, next year, you're going to build a levee to cover St. James; then, the next year after that, you have to build another levee to cover Ascension.

If you build one levee, follow the western side of Lake Ponchartrain, you eliminate all the other levees you have to build. And you're in one place. And that's got

to be a whole lot cheaper than all this, this levee here, then this levee there and that levee there, building levee on top of levee on top of levee for what?

If you build one, you eliminate all everything coming into Lake Ponchartrain going into Lake Maurepas with one levee, two pumping stations, and two set of locks, and everything else is finished. And you start right in the back corner of the Bonnet Carre Spillway where you plan on starting C and just follow the railroad track all the way into Ponchatoula. Two locks, two pumping stations, and you can finish everything west of that. That's all I have to say for.

MS. RUBY WHITE:

Yeah. My thing is with the zoning and the insurance. I think it has probably not that much with the Corps of Engineers, but I would like to get more information on how are they going about zoning it, with the insurance rates being almost 400 percent. And I think we need more information on that, because me and also my friends, we're having issues with that.

So I don't know if the Corps of Engineers have anything to do with that, but that's some of our concerns is that, the zoning. So if I could just get the information on the zoning and get to the proper people that I need to discuss that with, I will be pleased.

MR. VARISCO:

Yes, ma'am. I think you would do best to go -- I'm looking at Natalie here too, President Robottom. I believe you can go to the local planning.

MS. WHITE:

All right. thank you.

MR. JIMMY BRAZAN:

Yes. I'm here speaking on behalf of Timmy Roussel. He couldn't make it, and he apologizes he couldn't make it.

You know, I think everyone here is saying Alignment D is the right alignment. But we are here in St. James Parish. Y'all are still looking at Alignment C. And we do appreciate everything that has been said tonight about Alignment D. And we want to Alignment C to move forward. If we can't have Alignment D, we support the levee, you know, to protect St. John Parish.

But, you know, everybody has been, you know, thanking The Corps. But I'm not here to thank The Corps. I mean, you are building a levee everywhere but St. James Parish. You are building a funnel to St. James Parish.

Now, I'm not an engineer, you know, but I do know that, if you build a levee everywhere else and you leave

us out and you funnel it, then it's going to come to us. Sooner or later, it's going to come to us.

And, yeah, you can come in our parish and you can build up a few houses, you can do a few things, but the water is going to be around the homes. The water is going to be on our streets. It's going to be, you know, in our sewer systems. And the people aren't going to have any quality of life.

The -- I don't know, the belief that you can come here and levee everything from St. John Parish to the Gulf and leave St. James out and say that we should accept that, we should be -- that you are going to take care of us, I mean, you know, I just don't buy it. You know, it's just not something that we should, in St. James Parish, accept.

And that's why you are seeing everyone here telling you that Alignment D is the place to go, because it just doesn't make good sense to leave the small section out when you can protect everyone. You are not going to have, you know, accesses. If the water comes up and they can't use 51, they can't use the interstate, you're not going to have access to St. John Parish anyway if you protected it.

If you leave the industry, the people flooded with waters all around their homes, they are not going to -- a

good possibility they won't have electricity. They won't have the ability to get in and out of their homes. And so, even if they don't flood, they are not in their homes.

So those are the issues that we have to look at. You keep saying that you don't intend to flood anyone else, that's not your intent. But we understand that's not your intent. But that's what's going to happen. You are not going to be able to leave us un-leveed and expect the water to go somewhere else. It's got to come to us.

And, I mean, you can come in our parish and piecemeal and pick up here and pick up there, but that's not what our residents want. We want a comprehensive flood protection plan that will help us.

Now, also, you talked about the breakdown of the analysis, the economic analysis. Well, look, I have looked at this thing, and I just ain't smart enough to understand it. You need to break this down in layman's terms so people can understand what they are looking at and figure out if the dollars represent what you say they represent.

Look, I know y'all are in a tough position. I know y'all have to -- certain things you have to do. But St. James Parish is, you know, in a tougher position. In order for St. James Parish to survive, we have to have

flood protection, and I just don't see this Alignment C doing anything to help us in St. James Parish. Thank you.

MR. PAUL BAIR:

First off, I would like to thank that there are some efforts being put forth to help create a hurricane system or a hurricane protection system for the tri-parish area. I'm here on behalf of myself, as Jeff discussed, and the birds and the bunnies as well.

My wife and I own Cajun Pride Swamp Tours, which, as most people know, we are about a half-mile north of I-10 on Highway 51, directly across from the Highway 55 on-ramp, at the corner of 51 and Frenier Road.

And looking at all the proposals and talking to the zoning office, each of which divided my property, 55 acres, divides the property in half, which ultimately will either shut down the business, which has been opened since 1990 and is a pretty good attraction for the area, the tri-parish area, or it's going to greatly alter what we are able to offer the guests, local residents, and the tourists visiting Southern Louisiana.

We have been there for about two and a half years. Since then, we did go through Isaac. We have 15 employees, 3 of which did have dramatic damage to their homes. Our business, we actually had six feet of water

over the property and three feet through our building. So there is a need that we'd like to address, and not just our concerns are heard about our business, that our thoughts and inputs might be -- that we have some input that can be worked with The Corps in the ultimate outline of what might happen.

It's not just our business -- my employees that live in the area, they're affected by it -- but it's also the future of my family that I have to worry about, so I thank you.

MR. SCOTT EUSTIS:

My name is Scott Eustis. I'm representing the Gulf Restoration Network, born and raised in New Orleans and a place where we have learned a lot of hard truths about living in South Louisiana. And we wish The Corps would take these opportunities, not just to have a check box here, but to communicate what exactly the levees are and what they do.

It's hard to remember the lessons of Katrina. But we do not call levees -- there's a reason we don't call levees protection anymore rather than risks, risk reduction. What we have for New Orleans and what we have for the area is the 100 Years System, which means you've still got a one in four shot over a 30-year mortgage at flooding.

So the realities is -- the reality is, we need levees around developed areas. We need to elevate behind the levees. And we need the wetlands to protect us and to protect the levees.

I hear a lot about erosion. I think, if -- we wish this document contained a lot more of the science behind Coastal Louisiana. The science shows that we're sinking. We have engaged in a massive plan to restore the coast to keep us afloat as much as we can. But the bottom line is, we need to elevate, we need levees, and we need our wetlands.

This plan is a bit rushed. And it sets communities against one another, and it sets communities against our environment, even though we all value the place that we live and don't want to see it destroyed.

The Maurepas wetlands are a treasure, a global treasure. They're what we have left. It may be impossible to mitigate what's in this place in Louisiana, which is a unique place on the planet.

So this document is a bit rushed. We would like to see more options, like, in particular, see, you know, why in the study area communities upriver are not included in elevation plan -- in the elevation plan.

You know, in New Orleans, we flooded in the '90s. Every year, we flooded growing up. We had to get new

carpet. We had to get new air-conditioning, not from the tide, but from the rain. And what's not in this document, again, are the costs of impounding a system that's sinks.

In New Orleans, we have had levee improvements recently, and we need those. And now, to fix the drainage problem, we are looking for 6 billion more dollars to try to live with the water we've got.

We are not the only community in South Louisiana. You know, people in Plaquemine are also dealing with hard choices about what they have got to deal with. St. Tammany, Terrebonne Parish, we're all looking for a new way and a better way to live with the system we've' got.

MR. POCHE:

Could we get you to wrap it up, sir.

MR. EUSTIS:

So it's hard to talk about, and that's why The Corps doesn't talk about it. It's why politicians won't talk about it, is that we need all of these things to work together. We need to appropriate drainage, we need to elevate, we need levees, and we need our wetlands working together as the lines of defense. Thank you.

MR. TONY SCHEXNAYDER:

Thank you. Just to give you a short story, when the

storm came about, I put a couple of gauges around my house. I lived in St. James Parish. The water came up during the storm. I knew that was going to happen in some areas, so I was kind of watching it. And the storm passed. The water went down a little bit.

It's so emotional, because it was the worst days. So, anyway, that Thursday, I think it was, I was hearing St. John Parish flooding, Ascension flooding. What's going to happen? Well, it's common sense. I started digging holes in my yard with a trackhoe, building levees around my house.

At that time we didn't have no help. My wife thought I was the craziest man in the world digging holes all over the yard, you know. So when she got on the phone, saying, "Man, something's going on, My husband is going crazy," before you know it, I had all kind of people at my house helping.

You know, they had farmers all out there with trucks just coming up and down helping people, all the farmers, all their laborers. People in my yard, I didn't know who they were. I talked to one guy. He was from Gonzales. He told us, "Since we are pumping water to y'all, I got to come help y'all." Pizza Hut going down the road delivering pizza, giving free pizzas out. I mean, you've got to live it, you know. It's real.

And several things I heard out here, you know. Last week I heard, "The president said, 'Do not let it happen again.'" If you build these levees, that water will come in St. James Parish. It comes -- it goes there now with no levees. So now we're going to channel that water in St. James Parish, pumping from Ascension. They're channeling the water from the other side.

I don't know if anybody took this into consideration. After the hurricane -- I lived there 53 years. I know the area pretty good. After the storm, it really didn't rain. Rainwater also floods areas that there was no water. If it would have rained during that flood time, it would have been a lot worse. There was nowhere for the water to go.

Yeah. Things I heard, you know, is like economic decision, putting dollars over people. That's kind of hard, you know. If they build levees, we don't want to flood St. James Parish out. If you don't go with D -- y'all have to know that -- I mean, it's going to channel to St. James Parish. It's -- you know that.

When a guy came in, my insurance adjuster came in, I didn't have any water at my house, because we managed it four days. I don't think I slept two hours in four days. He was telling me I'm in a Flood Zone X. And, I said, "You know, I'm not too familiar with Flood Zone X.

I know A, B, and C."

He said, "Flood Zone X is supposed to flood once in every hundred years." And I'm sure y'all have seen the pictures.

Evacuation, we're going to let everybody get out. Let's go west, right? There is no way out. I don't know if y'all been there. I took a ride down the road. 61 flooded, Airline flood -- the interstate flooded. There is no way out. There is no way out. So don't think you're going to evacuate and get out. You had better do it a week ahead of time.

MR. POCHE:

Can we get you to wrap it up, please, sir.

MR. SCHEXNAYDER:

Yes. Well, did anybody ever consider pumping this water to the river? Down in Romeville area, they got big canals that go almost to the river. That's a way out, because the water will come this way, that we could pump this water out, put it in the river, and get it somewheres else.

You know, everybody in here heard, everybody. I didn't hear anything different. But I think everybody is pointing to Plan D. And we, the people -- that sounds pretty familiar, huh? -- we want Plan D.

DR. ANNROSE GUARINO:

Good evening. My family has been here in LaPlace and in St. John Parish since 1926, when we broke up -- it was broken up, the Woodland Plantation. My grandfather was one of the strip farmers that grew vegetables almost into the lake. Recently, as family got older and older, we sold our property. Thirty acres was wetlands, where my grandfather used to be able to grow vegetables.

My point is this: We know that our land in Louisiana, and to some all over the world, is somewhat sinking. That's not news to anyone. So that, if this is happening, we may need to consider that protecting what is left, what is left of our land, and if that is because of the intrusion of the lake has moved up further and further and further, closer and closer to our nice Mississippi River natural levee, then that may be it.

My first choice, of course, I like the railroad levee choice, because it seems awfully logical to me that that would be the best way to protect everybody. But I do see that that is not a chosen path, and I would like to commend, I know, all of the science, all of the agencies, all of the communities are trying to come together today and over the past few years to solve this very complex problem.

So since that one is not really a popular choice,

St. Charles, St. John, St. James, we call ourselves the River Parishes for a reason, because we are a united community. We help each other. We have agricultural land. I personally am a resident of St. John Parish, but we have agricultural land in St. James Parish which is very valuable. Maybe there are not that many people and houses there, but there's a lot of great soil to grow the commodities on that we really do need.

So I just would like to ask. I personally am an environmentalist. I, you know, don't want to hurt any of the animals in the wild; however, I think we need to consider that our world and our land mass is changing. And we have to mitigate that the best way we can. And I would like to see St. James completely included in the protection system. Thank you so much.

MR. REYNOLD HERNANDEZ:

Good evening. About eight years ago, I had met with the then-project manager, Brett Ayer, on Leake Avenue regarding the initial alignment. At that time, we had come up with Alignment B, and in that meeting he said at that time it's in violation of the NEPA Act. I asked why, and he said, well, we would be encapsulating too much swampland at that time, which seemed to be a big concern, which was of great concern to me also.

But one thing I tried to explain to him -- they were

convinced that all the swampland in St. John Parish was fed by Lake Ponchartrain. And he asked me, "How can you come up with that?"

And I said, "Water in St. John Parish flows north," to which I got a great big laughter. I said, "Well, I didn't go to college. I didn't become an engineer or all that stuff, but I'm from here. I grew up here all my life. Who better to ask about the flow of water than people that are from here? By The Corps's own admission, the river is 16 feet higher than the lake, so which way is the water going to flow? North." We see it every time it floods. That's the direction of the travel of flow of water.

If you look at your own maps that you have at The Corps, they are labeled tupelo, cypress, oak swamps. Tupelo does not grow in saltwater. So even if we went with Alignment D, the waters coming from the river with the downflow of rainfall, the swamp's going to survive. The animals will survive. Everything is going to make it.

But it still will provide us enough crash zone, which is what The Corps is after, a crash zone for the surge to slam into the trees before it would get, you know, an area of diffusion so it won't just slap straight up against the levee. I understand that. That's great.

That's why we came up with "B," but we're still leaning on the fact of the environmental impact.

Alignment D is not going to cause any more damage to the wetlands area than the I-10 mound is doing now. The water comes in. Every rain flow we get, every storm that we get, the water is going to flow out towards the lake. The surge is going to come in, but the rain flow is going to try to go out through the north. That's just the way it is here. Appreciate it. Thank you.

MR. WAYNE NAQUIN:

My name is Wayne Naquin. I like Zone -- the Plan D y'all got. But 30 years ago, The Corps has studied about blocking the water off at Chef's Pass. That's the way to do it to keep the tide from coming in altogether. If you block it off at the Chef or Rigolets Pass, the tidal surge would not come in and you won't need all these levees. Thank you.

MS. LATONYA CRESSY:

Good evening. My name is Latonya Cressy. And I was wondering. I'm no engineer, so I'm looking at this on here. And I was wondering, the next time when you all come, is it possible, because I know people get paid to do studies where you can measure 100 feet under the ocean, that there are engineers that get paid to do that, if there was any possible way that you could make a

small -- what is it -- to replicate the area and then do like a demonstration of how the waters flow with each one of these plans so I can see it like that or so the community can see it like that, how the waters channel or flow with each one of these options? Thank you.

MR. MIKE SHARPE:

Good evening. My name is Mike Sharpe. I'm from here in LaPlace. And, you know, we've talked about a plan that includes raising the homes and structures in St. James, but we had also mentioned about community. And there's a lot more to community than just a house. There's the grocery. There's the gas station, the fire department.

So I'm wondering if The Corps's plan took into account what it would take to protect that community and to raise those structures and to make sure that the things that make a community livable during, before, during, and after the storm are protected as well?

MR. VARISCO:

Since that's a question of fact, I'll go ahead. Yes. We did not just consider the residential structures. It's also commercial and industrial. So, I mean, not to your definition of "community," but yes, we looked at other structures, besides residential, for elevation.

MS. DINA MARTIN:

I'd like to thank you for hearing my voice today.

MR. POCHE:

Can you say your name for the record, please.

MS. MARTIN:

Dina Martin. I live in LaPlace. I live west of 51, and I was ran here by Katrina. Katrina left me with some horrible memories, because all I had heard was, "The Corps of Engineers fixed the levees." No, they didn't. They band-aided the levees, and you can see what happened to us in 2005.

I was told by residents here that they had not had any flooding for 30 years. So my husband and I, we had a home that was already paid for in New Orleans. We came here. We had to start all over with the mortgage. And on the same day, August 29th, seven years to the day, we were almost flooded again.

He's the president of Summerlin Lake Homeowners Association. I'm on the board also. And all I want to know is, what happened after 30 years to cause us to have this type of flooding?

I don't believe in dollars and cents when it comes to homeowners and their properties. I believe in fixing a problem that will help families and their

families further down the road for years to come.

This Plan C, I don't care for it. I don't care for "A." I don't care for plans that will help the community survive and not go through what we went through in Orleans and the surrounding parishes in 2005. Thank you very much.

MR. ARTHUR JONES:

My name is Arthur Jones. My concern right there is with "D" and the surrounding parishes that we look at it, and like the lady said, I don't want to get caught up in dollars and cents. To me, it doesn't make sense that we go a cheap way out, looking at a $10 million difference than lives. I think it's more important to save more lives than to worry about just the $10 million if we can do with Plan D and make it safe for St. John Parish and the rest of our surrounding parishes.

We looked at in New Orleans. We know what happened out there because the levees wasn't structured well and structured right. And I'm looking at, if we go the cheap way out, somewhere down the line, we are going to spend that $10 million. If we would have lost lives in these different parishes that, and, fortunately, we didn't, we would have been over $10 million.

So I think we need to actually look at Plan D with our surrounding parishes also so that we won't get caught

up in the long run later on down the line spending that same amount of money again trying to make a better structure. So I say, let's try to make the structure firm at the first beginning so we will try to save lives. It's more important to save lives than go the cheap way out. Thank you.

MS. SYLVIA DUNN:

My name is Sylvia Dunn. And, basically, I heard a consensus in the comments that I have heard so far, and basically what they say is, do not delay the levee for further study so it gets lost in the bureaucratic shuffle. This matter has been delayed much too long. Don't wait until St. John is flooded again or until St. James is flooded to the same magnitude as St. John was.

We are not divided. We are united. We want action now. The levee delayed is just like justice being denied.

MR. JAMES STEPHENS:

Good evening. My name is James Stephens. I live in Jefferson Parish, but I own some property in St. John Parish, very close to where that levee is going to come back to go to the river. I don't know if I will be inside of that levee or outside.

The old maps that I have show that that property was

farmed years back. It holds some water now, which I attribute to I-10 holding it in and not allowing it out. But anything that's on the west side of that levee is basically going to be condemned. I don't know if mine will be inside it to be condemned or not. I understand I have to look at the real estate.

But if the levee is not run all the way up into St. James Parish, that will preclude any development along Airline Highway that may come at a future time. If it's outside the hurricane protection system, nobody wants to do anything with it or won't want to do anything with it.

If it is protected, it will allow further development. And I think the levee should go all the way into St. James and Assumption Parish -- Ascension Parish. Thank you.

MR. EVERETT POWELL:

Good evening. My name is Everett Powell. I'm a resident here in Cambridge Subdivision. I just have a couple of questions to ask the board. Number one, what's the practicality of splitting this into Phase A and B or a two-part plan?

Two, most of the residents here are really concerned about their oncoming flood insurance increases and things like that. As soon as this stuff gets started and things

start to progress, that means our rates have the possibility of dropping. A lot of these residents probably won't be here when this levee is completed, because they're going to be forced out by high insurance rates and things like that.

So my first question is, what is the practicality of splitting this in a two-part plan where we might get started a little bit earlier? And once we are through this process and a levee is started, what is the estimated amount of time on "C" or "D" from start to finish?

MR. VARISCO:

What we are under right now is the feasibility phase. And the culmination of that is the signature of the report by the Chief of Engineers in Washington. From that standpoint, that report is then provided to Congress and it's up to them to act. And so we are not really able to give you a precise time of how long it would take.

But in terms of phasing, that's also a decision that might be up to the Congress. If they decide, well, we believe that first part should be built now, they may tell us to do that, and that's what we would carry out. So it's really not a decision that's up to the folks that are studying it. It's up to the folks

that make the decisions and provide the construction dollars for a project.

MR. POWELL:

Well, that leads to my last question: Is there any way that we can effect as residents of this parish, in your opinion?

MR. VARISCO:

Certainly. That's what we are doing tonight. You're providing your opinion which is going to be included in the report. And that will be transmitted to the Chief and then along to Congress. And, also, you certainly have the right to contact your representatives and express your views.

MR. POWELL:

Thank you.

MS. NATALIE ROBOTTOM:

Parish President Robottom. First of all, all the comments are very consistent with what your representatives have been expressing. It has been a constant theme, and I want to share with you, your congressional delegation is on board with us. We had a letter from Senator Vitter. But please be aware that all of our delegation has written a letter in support of Alignment D.

Of course, how you help us is to help them advocate

for the funding. So this is one step that we are moving in. We are moving simultaneously. This is a critical step. Whether we finalize "C" or "D," this has to take place in order for us to get the money. But know that all of us are working. The same time this study is moving through, we are working on funding as well so that construction can culminate once it's approved.

But all of you have all of our support. We're going to continue to work toward Alignment D. We also are going to continue to work toward funding, which is critical. It doesn't matter if it's approved and it's a plan and The Corps accepts it, Congress accepts it. We need the money to construct it. So work with us to continue to work toward getting these projects done.

MR. ANTHONY WAGUESPACK:

Anthony Waguespack. I live in River Forest Subdivision here in LaPlace. And I just got back in my house. And I don't wish this on anybody, having to fool with the waters and stuff, having to watch the water come in.

The easiest way and the best way to prevent everyone from having to go through this is to go get -- go all the way to Gonzales for Plan D. And if you've got to go to Baton Rouge, go to Baton Rouge. But, at least, you will have everybody protected.

MR. STEVE WILSON:

Thank you, Rene. I just want to maybe answer a couple of comments that I heard. I'm glad that everybody is on board with Plan D, because, like I said before, that is what the Levee District and, I know, the parish presidents are going to continue to support through the process. We are a year away from going to Congress and then begging them to fund this levee, so keep that in mind, what Ms. Robottom was referring to.

For two things I heard that trouble me, and I want y'all to understand, we have set the Levee District and The Corps from the inception of this last feasibility study here in '04 and talked to the environmental concerns. Dr. Klein that's here tonight and knows well that we share the concerns about destroying the wetlands.

Just to respond to the comments we heard earlier, the colonel and I are set to go up in a helicopter and look at what I consider to be a model in St. Charles, where we protected the wetlands.

And the last comment I want to make, because I would pop if I didn't, is, the gentleman that said this is a rush study, I challenge you to stand at the doorway right there and address these people on their way out and tell them that 40 years is a rush study. Thank you.

MR. TONY SCHEXNAYDER:

This is what, with our final conclusion, I wanted to ask. I know y'all need your hard data. You can't put a dollar sign on what we went through, but during this time of the flood -- I'm sure y'all have got family. Y'all are welcome to come to my house. And if it's not good enough for y'all to bring your family to my house, it shouldn't be good enough for my family neither. We shouldn't have to put up with this. So sometimes you just better do the right thing to protect the people. Thank you.

(End of proceedings.)

C E R T I F I C A T E

I, Annette Ross, Certified Shorthand Reporter in and for the State of Louisiana, as the Officer before whom this testimony was taken, do hereby certify:

That the proceedings as herein before set forth in the foregoing 36 pages was reported by me in stenographic machine shorthand, transcribed by me or under my personal direction and supervision, and is a true and correct transcript to the best of my ability and understanding;

That I am not of counsel, nor related to any person participating in this cause, and am in no way interested in the outcome of this event;

That the transcript has been prepared in compliance with the transcript format guidelines required by statute and by rules of the board;

That I have acted in compliance with the prohibition on contractual relationships as defined by Louisiana Code of Civil Procedure Article 1434 and in rules and advisory opinions of the board.

This certification is valid only for a transcript accompanied by my original signature and original blue stamp on this page.

_____

ANNETTE ROSS,

CCR NO. 93001

26th day of September, 2013

U.S. ARMY CORPS OF ENGINEERS

PUBLIC MEETING COMMENTS

****

IN RE: West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study Integrated Draft Feasibility Report and Environment Impact Statement

****

ABOVE-ENTITLED MEETING
WAS HELD ON OCTOBER 2, 2013, AT THE
LAMAR DIXON EXPO CENTER GYMNASIUM
9039 S. SAINT LANDRY AVENUE
GONZALES, LOUISIANA

MODERATOR: MR. RENE POCHE

REPORTED BY: ANNETTE ROSS, CCR, RPR

JUDY P. FOUST, INC.
CERTIFIED COURT REPORTERS
145 ST. JOSEPH STREET
BATON ROUGE, LOUISIANA 70802-5739
(225) 344-2270

APPEARANCES

PANEL MEMBERS:

Colonel Rick Hansen, Commander, Army Corps of Engineers New Orleans District

Mr. Jeff Varisco, Project Manager, WSLP

Mr. Travis Creel, USACE

ANNETTE ROSS, CCR NO. 93001,
Certified Court Reporter, in
And for the State of Louisiana

* * * * *

INDEX OF PUBLIC SPEAKERS

Page

MR. RANDY CLOUATRE 4

MR. BILL ROUX 5

MR. CLINT COINTMENT 9

MR. KENT SCHEXNAYDRE 12

MR. HENRY GRAHAM 14

MR. MONICA SALINS 16

* * * * *

TRANSCRIPT OF PUBLIC COMMENTS

MR. RANDY CLOUATRE:

My name is Randy Clouatre. I'm councilman of Ascension Parish and the chairman of East Ascension Drainage. First of all, I want to thank the colonel, all of the staff, all you guys, for coming out and having a meeting with us.

We do believe that, on behalf of the drainage district, that Alignment D is very important, important for everything for us to totally close, protect the people of the southeast portion of Ascension Parish. We think that it's feasible. We think that we can work it out.

I want to take this opportunity to thank President Martinez, thank President Wilson for encouraging to back this effort, no matter what happens at the Corps level. Once again, I just want to let you know that Mr. Roux, who is our drainage director, will be up, and we will enter our comments into the project.

So, please, Colonel and staff, take every opportunity. With what we had is a short time to put together what we needed to put together to try to enter our comments into this study.

We do have possibly, before the end of the comment deadline, some more economic development comments from

our economic development group. We have a large portion of industry in Ascension Parish. And so does St. James, which we share the same swamp. So we will have that coming later.

Once again, on behalf of the people in the southeast portion of Ascension Parish, we would appreciate you taking every opportunity that you can to take a look at Alignment D and get that in hand. We will work with whatever agency is willing to bring that alignment to us. Thank you.

MR. BILL ROUX:

I'm Bill Roux, director of drainage for East Ascension Drainage District and also Ascension Parish. This is our official submittal to The Corps for Alternate D route. I am going to try to get through this pretty quick, just briefly.

Because the original legislation authorizing this study did not include Ascension Parish, no benefits to this area within Ascension Parish affected by the levee's Alternate D route were included in the benefits evaluation, although the costs were. As a result, this skewed analysis produced a B/C Ratio and Annual Net Benefits that concluded the best use of resources was for the construction of the levee as per Alignment C.

Ascension Parish and St. James Parish do not agree

with this conclusion and request the U.S. Corps of Engineers to include Ascension Parish in the evaluation area. To this end, Ascension Parish submits the following data for consideration. The following information was produced utilizing the Ascension Parish GIS Department, Moody's County Forecast Database, and the National Economic Development Procedures Manual for Flood Risk Management.

If you go to page 3, I included charts that were within your report and, what I did, just added information for Ascension Parish. If you will notice Table 1 is Land Use in the Study Area of 230,000 acres. Ascension Parish study area, if you include that, you include another 43,702 acres. That's a 19 percent increase in total acres.

If you go to No. 4, page 4, Historical and Projected Parish Population. You looked at -- I'm looking at the total for, say, 2020 and 2080 in the St. Charles, St. James, and St. John the Baptist area. You're looking at 130,000 and 152,000 respectively.

Ascension Parish is the fastest -- one of the fastest, if not the fastest growing parish, and Ascension is one of the fastest growing counties in the nation. Our projection through Moody's database projected Ascension Parish to go in 2020 to about 131,000 and, by

2080, 258,000, which is an increase of 170 percent of what y'all evaluated already.

The Existing Condition and Projected Population Within the Study Area, I used the same percentages y'all used to build conservative. We have still got a net increase from what was analyzed already, a 37 percent increase over what was projected.

The Number of Households, the same thing, goes anywhere between 90 percent -- 97 percent to 196 percent all the way up to 2080, a big increase, a big benefit if you figure this into the old ratio.

No. 6, and this is really where it comes to, to our support of Alignment D. If you look at the Equivalent Benefits, you're looking at 59,000 that was projected in your chart. But if you add a real modest 30 percent increase in benefits, and we feel it will be a lot more than when you do a full analysis, but just increasing the net benefits by 30 percent, you're looking at 77 million in benefits.

The costs don't change, because that's always figured in. B/C ratio rate is 1.67. More important than that, you're looking at an Equivalent Annual Net Benefits of 31 million compared to C of 23 million. So, again, you're looking at, roughly, a modest increase of 30 percent. You're looking at it, in our same B/C ratio,

there's a huge 25, 26 percent increase in the Net -- Annual Net Benefits.

And, again, you mentioned, Jeff, a minute ago, that that is the most significant number there. As per the National Economic Development Procedures Manual (as read by Mr. Roux):

> "The most efficient use of resources for any one project comes when the benefits exceed cost by the maximum amount. The maximum net benefits comment is, therefore, the best measure of investment, because it contributes the highest dollar value of increased output."

And, again, that goes to back to that 31 million compared to the 23 million.

Based on the data presented herein, Ascension and St. James Parishes request the inclusion of benefits to Ascension Parish gained by the construction of Alignment D of the West Shore Project. The B/C ratio, and, most importantly, the huge increase in the Equivalent Annual Net Benefits of Alignment D make the decision to recommend Alignment D an obvious choice.

Also included are maps that we figured are included in the affected areas. It affected the Panama/Conway and the canals in the lower part of the parish, and also have inundation from different elevations and, also, the

result of inundation from Isaac, Hurricane Isaac. And we also have the Resolution from East Ascension Drainage Board and Parish Council recommending D.

The last comment, real briefly, you mentioned about environmental impact. Well, we have a lot of levees within our parish, and we have a little bit of a conflict of opinion with this. We always believed that we were able to, in the past, to justify our levees by, purportedly, the opinion that the levees don't hurt the wetlands behind it.

If your operational plan takes into consideration the normal operations that allows the free flow of water back and forth just like (inaudible) did when we had the levee there before. We justified that in our other levee projects, and I think that can be justified with this too. Thank you.

MR. CLINT COINMENT:

Thank you for allowing us to come, the state, Ascension Parish residents, and local business owners. I had some concerns, because I believe one of the main sticking points is going to be wetlands. And so I just want to touch base on some of the concerns of our wetlands.

Here in Ascension Parish, we have a levee system. We see little or no impact to our wetlands as Mr. Bill

Roux mentioned. We allow for the natural water inflow and outflow during non-storm events. So that's very important that we have very little impact.

I think the thing here in Ascension that concern us more is saltwater intrusion. I noticed that, after major storms, we continue to get saltwater intrusion through Pontchartrain and the Maurepas. If you take a boat ride from Pass Manchac, you will notice very little thriving cypress trees and, almost none, sweet gum tupelo. That is caused from saltwater intrusion, and that's what leads us to constantly lose our coastal wetlands.

Actually, these levees will be a benefit to our wetlands, protecting our wetlands from the saltwater intrusion. So there is a benefit on the back side of that, keeping saltwater -- keeping our wetlands healthy.

In addition to that, I was a little concerned about the cost to benefit analysis. I believe as the previous speaker spoke on some of the issues that I don't think were computed, I think a lot of the residents in Ascension and St. James are not computed, as well as the future communities are not computed into that cost analysis.

I noticed you didn't have a change in your cost analysis from Alternates C or D. And I thought that was interesting, because, obviously, as you protect a greater

amount of citizens, structures, economics, businesses, that nature, there is a benefit to that. And that's not shown on your chart. And so that's something that stood out immediately to me.

One of the more important things is the protection of the evacuation routes. I noticed that that wasn't computed. We're talking about our two major evacuation routes of US-61 and I-10 out of New Orleans and the surrounding parishes. As we noticed in Katrina, we had damage to the twin span. We don't want to eliminate the possibility of that happening to these evacuation routes. I think that that would be a detriment.

And when we assess a cost of just over a little 1 percent that we have on the charts there of doing these levees, the first thing that comes to mind is loss of life. When we look at a cost of benefit or a cost to complete the project, 1 percent of the overall, and that's huge. I think that really needs to be noted in a percentage perspective of what we're talking about when we talk about governmental projects, 1 percent.

And I think, if we choose not to do Alternate D and we do have a loss of life, I don't think at this point we want to look back and look at a cost to benefit ratio number or a 1 percent cost to overall project and say that could have saved a life or could have destroyed our

evacuation route. So I hope you take that under consideration, and have a good day.

MR. KENT SCHEXNAYDRE:

Thank you very much. I'm Kent Schexnaydre, a local Parish councilman that is directly affected by this plan. And I appreciate y'all coming today and giving us the opportunity.

One of the things that we need to really talk about is really having some common sense about, and I know the cost to benefit ratios, what you have to go by, but to really take a look at the cost of the closure of I-10, Highway 61, and the railroad. No one has mentioned the railroad. I stood on top of the railroad when they had a foot of water on it last (inaudible), south of Sorrento during that time when all the transportation was stopped. That is very, very important in the cost/benefit ratio.

The industrial risks that indirectly is affected by storm surges of this sort, you may not directly affect the plant, and which we have many of them, but to not have the workers or the suppliers being able to access that plant is very important. And the costs that are involved are tremendous.

We have the type of existing -- common sense to tie it into the existing levee system is very important, that

the people of Ascension Parish have spent almost $200 million in the past 30 years with the levee system, and to tie into that and complete that loop would be very important.

And I think we are all concerned about the environmental impact, but I don't think the environmental impact will be as great as what everyone is talking about, because that was done already in the '60s when the interstate was built. So the environmental impact of running a levee along that interstate would only be affected for a few hours or a few days with storm surge. The rest of the time, it would be just like it is now. It would not be changed. So I think that's something that really has to be looked at.

Sooner or later, as we continue these levee improvements, we are going to have to look at pumping the water out of this system. This lake system that we have, we are going to have to get the water into the Mississippi River through the Comite Diversion and through some kind of Blind River or other diversion.

And, also, at some point in time, we will have to look at -- because they were talking about, excuse me, the Blind River pumping station being so expensive, what we were trying to stop is, the Blind River at that time was going backwards. So pumping the water out, the idea

of the rain event is not a big risk in this area as it is, we are looking at stopping the storm surge. So I think that could be compromised into having something that would be a preventive measure instead of pumping out. Thank you.

MR. HENRY GRAHAM:

Good evening. My name is Henry Graham. I'm vice president of environmental affairs and legal counsel for the Louisiana Chemical Association.

LCA's trade association, we represent over 75 -- over 65 companies and over 100 plant locations throughout Louisiana. The majority of our facilities are located in the Baton Rouge to New Orleans Corridor. We have currently at plans, not just talking about existing, the plan for over $16 billion in investments in new facilities in the areas that will not be improved by this alternative.

Alternative D is critical for our industry, because our most important resource is our people. Without our people, we cannot run our facilities. Without our facilities operating, you cannot get the gasoline you need, the plastics you need, the fuels, and the other critical ingredients that they serve our lot.

It is very important also for our facilities, not only for the operational part of our facilities, but the

transportation infrastructure. We all saw last summer the problems that we ran into when one little section of I-10 was shut down because of a flooding. Well, all you're going to do is move that problem down the interstate. If you don't take Alternative D, you still are not going to be protecting I-10. You will take away, with I-10 and 61 are the key evacuation routes for all of Southeast Louisiana, and those certainly need to be factored into your equation.

It appears, from our review, that you included the cost, but did not include many of the benefits as a result of this project. We recognize that you are limited by legislation. But at the same time, there is over half of the population would not be served by selecting Alternative C. Alternative D has more people that would be protected, twice as many people, as would Alternative C. It also has more facilities, more roads and infrastructure.

And so we caution you in your analysis to make sure that, while you are meeting the letter of the need for requirements of examining alternatives, it's very critical that you examine all of the costs and the benefits derived. We can't operate our facilities without transportation facilities, roads, railroads, shipping, loading and unloading facilities docks, and

many of those facilities would be impacted by a storm surge coming into this area.

I think Mr. Zeringue also mentioned about the Coastal Protection Restoration Authority Master Plan. We worked with a work group on that plan, and it was very important for us representing the manufacturing interest, that, as part of that plan, they considered the impact of facilities and infrastructure.

And I think, if you look at that plan, you will see there's over a dozen different factors, including protection of wildlife, protection of marsh lands, protection of infrastructure. All of those were considered. And as a result of that, the recommendation was made that Alternative D in that plan would provide sufficient protection and still provide environmental benefits.

So we urge you to consider Alternative D. We think it's a more responsible plan, and it would provide a greater protection for the citizens of Louisiana. Thank, you, sir.

MONICA SALINS:

Thank you. You know, I have been to the last couple of public meetings, and, Colonel, I would really like to thank you very much for having us here. And it was important to the people here in Ascension Parish. I

think it's important to represent all parishes, especially where this particular study is involved.

As executive director of the Pontchartrain Levee District, I reviewed the Integrated Draft Feasibility Report and Environmental Impact Statement for West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study.

I offered several comments, suggestions, and questions. And when I began to compile this letter, I had a few comments, a few questions. And as the day went on, I had more. I have about ten here. I'm not going to read all 10, because now I have 15. There have been a lot of, you know, wonderful comments and no better to actually submit the comments to the people from this area.

There are a couple that I would like to touch on, though. In the presentation, Mr. Varisco, you referenced a slide comparing the plans referencing the annual cost. If the O & M -- that's operation and maintenance -- of this levee system is 100 percent non-federal and the locals fully embrace the responsibility of this cost, then why not do a what-if scenario of the alternatives, with O & M costs excluded, and see how the benefit/cost ratios would compare with just construction cost?

If that's not a federal cost, the local sponsor,

being Pontchartrain Levee District, and the parish are knowledgeable and willing to absorb the O & M cost, then why include it in the selection of alternatives? Just because regulations say so?

I understand that there are regulations, but it doesn't mean that they are correct and proper. I understand that it's not likely to get a change in the policy governing how this is computed any time soon. But as local sponsor, I request that a what-if scenario be included and factored in the report for informative purposes to show how close Alternative C and D actually are.

Page 2-7 talks about the LCA Convent Blind River Diversion Project has the potential to locally reduce stress and improve dissolved oxygen levels. So the report admits to a salinity problem. The levee would do wonders to help that. It also says that the Maurepas Swamp is expected to continue to decline and convert to open water without the project.

Why are we being assessed mitigation costs against the project when the report clearly indicates these wetlands will be lost by 2070 due to subsidence and sea level rise? Wouldn't you think that the protection levee would help protect the 79 square miles of wetlands? Where is the proof that the wetlands behind the levee

will be lost by 2070? Why doesn't the project get mitigation credits for saving 79 miles of wetlands?

Another point: On page 2-13, I strongly disagree that no action there would be no direct impact on community and regional growth. If there is no protection provided, the impact from Biggert Waters Act is going to have a major adverse impact to community and regional growth. The regional growth would come to a screeching halt and then decline. We are not advocating development of wetland areas for community growth; in fact, we have offered to purchase private wetlands and put them in public trust, but they're a vast agricultural land that could be developed.

I also disagree completely about the indirect and cumulative damages to the wetlands. I-10 already serves as a barrier to the wetlands as a "levee." The culverts underneath do not pass much water. A USACE analysis has indicated this. Unfortunately, the resource agencies have refused to accept the analysis. The Corps should be counting the benefits for protecting the marsh, not charging for mitigation for damaging it. This doesn't make any sense.

On page 3-12, it states that (as read by Ms. Salins):

"Alternative D poses potential

uncertainties concerning impoundment of large areas of wetlands, especially if the river diversions are constructed. While it would prevent saltwater intrusion, it would risk impacting the hydrology by encompassing approximately 54,800 acres of swamp and would impact the environmental quality of the Maurepas wildlife Management Area as well as Blind River, unquote.

Where is the evidence that the levees will damage the wetlands? I cannot find the answer within this report. It doesn't exist. It's the opinion of the environmental types is my opinion.

What about where the levees have helped the wetlands? Anyone can see for themselves if they drive down I-310 where the levees have helped along the Lake Pontchartrain and Vicinity Hurricane Protection Levee, St. Charles Parish polder. The cypress trees are bare and deteriorated near Lake Pontchartrain and the cypress trees are vibrant and healthy along Airline Highway behind the St. Charles Parish Hurricane Protection Levee.

There is your evidence. You can see it on the way to Grand Isle where you cross the levee in Golden Meadow. You can see it on the -- look at the aerial

photos of South Lafourche after Hurricane Rita. You can see open water outside the protection levee and healthy, vibrant, forested wetlands inside the protection levee. Again, is this a bad thing? I have not seen it first-hand, but I'm told the same vibrant wetlands exist in St. Bernard Parish and down in Plaquemines Parish.

The Mississippi River Corridor between New Orleans and Baton Rouge is a major industrial and petrochemical plant hub for the country. Products from these industries and plants are shipped via pipeline to all parts of the country. Alternative D provides the least impact to these pipelines compared to Alternatives A and C; Alternative D, for instance, 14 pipelines versus 36 crossings, versus 70 crossings, respectively.

We have reviewed the pipeline relocation costs and feel these costs have not been fully evaluated. While the construction cost to relocate the pipelines was included per Engineering, Appendix B, the pipeline outage cost and loss of material cost were not included.

Those are significant dollar figures to leave out of this study, because that is left up to us. If AT&T charges $6,000 per minute for lost time on a fiberoptic line, what is the cost for a 6-inch, 12-inch, 18-inch, 24- and larger pipelines? How many gallons of product will be wasted during the tie-in procedure, and how much

would that cost?

I could go on and on, and I won't. I will submit all my comments by next Tuesday. I have several of my pages just keep getting longer and longer. Please place these comments and these questions in your report.

And, as 50 percent owner of this study, I trust that the answers to these questions and all of the questions that have been submitted by all of the interested parties from the people within the parishes, from all the public meetings, the e-mails, and U.S. mail will be provided to Pontchartrain Levee District within 30 days after the close of the comment period. So I'm asking for the answers to all of these questions by November 18th of 2013.

Pontchartrain Levee District Department, Ascension, St. James, St. John the Baptist Parish, and St. Charles Parishes are all in agreement, and we are all in favor of Alignment D.

Colonel, you said in the beginning, Pontchartrain Levee District has been partners with you for quite some time, and we worked very well as partners for many years. And as a partner, the Pontchartrain Levee District has confidence to be treated as such, of equal rank, consideration, and compromise, when there are differences. Thank you.

(**End of Proceedings.**)

C E R T I F I C A T E

I, Annette Ross, Certified Shorthand Reporter in and for the State of Louisiana, as the Officer before whom this testimony was taken, do hereby certify:

That the proceedings as herein before set forth in the foregoing 22 pages was reported by me in stenographic machine shorthand, transcribed by me or under my personal direction and supervision, and is a true and correct transcript to the best of my ability and understanding;

That I am not of counsel, nor related to any person participating in this cause, and am in no way interested in the outcome of this event;

That the transcript has been prepared in compliance with the transcript format guidelines required by statute and by rules of the board;

That I have acted in compliance with the prohibition on contractual relationships as defined by Louisiana Code of Civil Procedure Article 1434 and in rules and advisory opinions of the board.

This certification is valid only for a transcript accompanied by my original signature and original blue stamp on this page.

_____

ANNETTE ROSS,

CCR NO. 93001

17th day of October, 2013

Town of Lutcher

St. James Parish
P. O. Box 456 Lutcher,
Louisiana 70071
Telephone: (225) 869-5823
Fax: (225) 869-9628

Mayor
Rowdy K. Scott

Aldermen
Donald J. Batiste, Sr.
Thomas D. George
Danny B. Manuel
Darlene F. Riley
Patrick P. St. Pierre

Town Clerk
Vanessa C. Roussel

Town Attorney
Wilbur W. Reynaud

Chief of Police
Dwan B. Bowser

October 3, 2013

Colonel Richard Hanson
New Orleans District
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160

Dear Colonel Hanson:

Enclosed is a copy of Resolution 13-13 which was passed at the regular meeting on Tuesday, October 1, 2013 by the Board of Aldermen of the Town of Lutcher in support of Alternative D.

Please consider this Alternative and provide hurricane protection to all in the Town of Lutcher and St. James Parish.

Thank you for your consideration in this matter.

Sincerely,

Vanessa C Roussel

Vanessa C. Roussel, MMC
Town Clerk
Town of Lutcher

Enclosure

Received By
CEMVN-EX
US Army Corps of Engineers
New Orleans District

OCT 7 2013

Alderman George moved, seconded by Alderman Manuel to approve Resolution 13-13 as follows:

RESOLUTION 13-13
TOWN OF LUTCHER

A RESOLUTION REQUESTING THAT THE U. S. CORPS OF ENGINEERS RECONSIDER THEIR RECOMMENDATION FOR THE WEST SHORE LAKE PONTCHARTRAIN HURRICANE PROTECTION LEVEE AND CHOOSE ALTERNATIVE D

WHEREAS,South Louisiana has experienced an increase in flooding and flood damages in recent years from major hurricanes and other tropical weather conditions; and,

WHEREAS, the parishes of Southeastern Louisiana have worked hard to rebuild their communities and often times have shared resources, man-power, and equipment to aid and assist one another during flooding disasters; and,

WHEREAS,the economic growth and stability of our Region depends on adequate protection from storms and flooding in all of the parishes in Southeastern Louisiana; and,

WHEREAS, the recently released Corps of Engineers' West Shore Lake Pontchartrain Study recommends Alternative C as the tentatively selected plan; and,

WHEREAS, Alternative C provides for a levee from the Bonnet Carre Spillway to the Hope Canal and the Mississippi River in Garyville, Louisiana, thereby, leaving an area of approximately 10 miles from western St. John Parish to Ascension Parish without federal hurricane protection levees; and,

WHEREAS, Alternative C provides no hurricane levee protection to St. James Parish, which will force backwater flooding to Blind River and into homes, businesses, and industries within St. James Parish; and,

WHEREAS, the West Shore Lake Pontchartrain Study notes that the difference in cost from Alternative C to Alternative D is approximately $10.2 million; and,

WHEREAS, Alternative D provides a continuous hurricane protection levee from St. Charles Parish to Ascension Parish, thereby, closing the gap in the levee system and providing a complete West Shore Lake Pontchartrain Hurricane Levee System:

NOW, THEREFORE, BE IT RESOLVED, by the Board of Aldermen that the governing body of the Town of Lutcher hereby requests that the Corps of Engineers reconsider their recommendation of Alternative C and provide hurricane protection to all citizens, businesses, and industries within the River Parishes through the selection of Alternative D; and,

BE IT, FURTHER, RESOLVED that a copy of this resolution be forwarded to the members of the Louisiana Federal Delegation and the State Senator and Representatives who represent the River Region Area.

And, the resolution was declared adopted on this, the 1st day of October 2013 by a roll call vote.

Rowdy K. Scott, Mayor

CERTIFICATE

I, Vanessa C. Roussel, MMC, Town Clerk for the Town of Lutcher, do hereby certify that the

TOWN_9-18-2013_1_Terry Borne

Town of Gramercy

"THE BEST LITTLE TOWN FOR MILES AROUND."
120 North Montz Street
P. O. Drawer 340
Gramercy, Louisiana 70052
Phone 225-869-4403 • FAX 225-869-4195

Aldermen

Betty Cooper-Coleman
District 1

Jody Bourgeois
District 2

Rhonda Lee
District 3

Claude "Clyde" Wiggins
At Large

Rubenstein Mitchell-Clark
At Large

Lydia Z. Louque
Town Clerk

Robert Faucheux, Jr.
Town Attorney

Terry J. Borne
Mayor

Brent Dicharry
Police Chief

September 18, 2013

Dr William P Klein Jr
US Army Corps of Engineers
Regional Planning and Environmental Div. South
New Orleans Environmental Branch
PO Box 60267
New Orleans LA 70160-0267

Dear Dr. Klein:

The Town of Gramercy, Louisiana, St. James Parish has reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the Corps of engineers to evaluate the different alignment options.

Although Alignment C is tentatively chosen, the Board of Aldermen and Mayor of the Town of Gramercy are requesting assistance to promote the option of Alignment D. The State of Louisiana Master Plan also shows Alignment D as the preferred plan. Alignment D is the only option that will provide levee protection to Gramercy and St. James Parish. The overturn of this decision is important to insure the safety of families, properties, and/or businesses during the event of a hurricane or tropical storm. Gramercy sustained flooding of a number of homes during Hurricane Isaac and should Alignment C be chosen, will create even greater flooding to our community.

It is critical that members of our community, as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance you can provide will be greatly appreciated.

Sincerely,

Terry Borne
Mayor

Enclosure

RESOLUTION 18-13

A RESOLUTION REQUESTING THAT THE U. S. CORPS OF ENGINEERS RECONSIDER THEIR RECOMMENDATION FOR THE WEST SHORE LAKE PONTCHARTRAIN HURRICANE PROTECTION LEVEE AND CHOOSE ALTERNATIVE D

WHEREAS, South Louisiana has experienced an increase in flooding and flood damages in recent years from major hurricanes and other tropical weather conditions; and,

WHEREAS, the parishes of Southeastern Louisiana have worked hard to rebuild their communities and often times have shared resources, man-power, and equipment to aid and assist one another during flooding disasters; and,

WHEREAS, the economic growth and stability of our Region depends on adequate protection from storms and flooding in all of the parishes in Southeastern Louisiana; and,

WHEREAS, the recently released Corps of Engineers' West Shore Lake Pontchartrain Study recommends Alternative C as the tentatively selected plan; and,

WHEREAS, Alternative C provides for a levee from the Bonnet Carre Spillway to the Hope Canal and the Mississippi River in Garyville, Louisiana, thereby, leaving an area of approximately 10 miles from western St. John Parish to Ascension Parish without federal hurricane protection levees; and,

WHEREAS, Alternative C provides no hurricane levee protection to St. James Parish, which will force backwater flooding to Blind River and into homes, businesses, and industries within St. James Parish; and,

WHEREAS, the West Shore Lake Pontchartrain Study notes that the difference in cost from Alternative C to Alternative D is approximately $10.2 million; and,

WHEREAS, Alternative D provides a continuous hurricane protection levee from St. Charles Parish to Ascension Parish, thereby, closing the gap in the levee system and providing a complete West Shore Lake Pontchartrain Hurricane Levee System:

NOW, THEREFORE, BE IT RESOLVED, by the Mayor and Board of Alderman, that the governing body of Town of Gramercy hereby requests that the Corps of Engineers reconsider their recommendation of Alternative C and provide hurricane protection to all citizens, businesses, and industries within the River Parishes through the selection of Alternative D; and,

BE IT, FURTHER, RESOLVED that a copy of this resolution be forwarded to the members of the Louisiana Federal Delegation and the U. S. Senators, State Senators and Representatives who represent the River Region Area.

A vote on the above resolution was as follows:

YEAS: Bourgeois, Clark, Coleman, Lee, Wiggins

NAYS: None ABSENT: None

And the resolution was adopted on this the 9th day of September, 2013

I, Lydia Z. Louque, Clerk of the Town of Gramercy, Louisiana, do hereby certify that the above is a true and correct copy of a resolution duly adopted by the Board of Aldermen of the Town of Gramercy, Louisiana, duly convened on September 9, 2013

Lydia Louque

Lydia Louque, Town Clerk

CD _9-18-2013_1_David Vitter

13-045

DAVID VITTER
LOUISIANA

DEPUTY WHIP

Environment and Public Works
Top-Ranking Republican

Armed Services

Banking, Housing, and Urban Affairs

Small Business and Entrepreneurship

United States Senate

WASHINGTON, DC 20510

September 18, 2013

WASHINGTON, D.C.
HART SENATE OFFICE BUILDING
SUITE SH-516
WASHINGTON, DC 20510
(202) 224-4623
FAX: (202) 228-5061

BATON ROUGE
858 CONVENTION STREET
BATON ROUGE, LA 70802
(225) 383-0331
FAX: (225) 383-0952

Website with E-Mail Access:
vitter.senate.gov

Colonel Richard Hansen
New Orleans District Commander
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160

Dear Colonel Hansen,

My constituent, Paul Bair, has contacted me about a problem he is having with the proposed levee alignments for St. John the Baptist Parish. He is concerned with how the proposed levee construction will affect his family's business, Cajun Pride Swamp Tours. Currently, his property is subject to being bisected by current proposals and he has listed questions about the construction of the levee that he would like answered. I have added the letter he sent to our office that includes theses questions and his concerns.

I have explained that I would bring this matter to your attention to address his concerns directly.

I would appreciate it if you would respond to Paul Bair's concern.

Thank you for your attention to this matter.

Sincerely,

David Vitter

David Vitter
United States Senate

Received By
CEMVN-EX
US Army Corps of Engineers
New Orleans District

SEP 20 2013

ACADIANA
2201 KALISTE SALOOM ROAD
SUITE 201
LAFAYETTE, LA 70508
(337) 993-9502
FAX: (337) 993-9567

CENTRAL LOUISIANA
6501 COLISEUM BOULEVARD
SUITE 700-A
ALEXANDRIA, LA 71303
(318) 448-0169
FAX: (318) 448-0189

NORTHEAST LOUISIANA
1651 LOUISVILLE AVENUE
SUITE 148
MONROE, LA 71201
(318) 325-8120
FAX: (318) 325-9165

NORTHWEST LOUISIANA
920 PIERREMONT ROAD
SUITE 113
SHREVEPORT, LA 71106
(318) 861-0437
FAX: (318) 861-4865

SOUTHEAST LOUISIANA
2800 VETERANS BOULEVARD
SUITE 201
METAIRIE, LA 70002
(504) 589-2753
FAX: (504) 589-2607

SOUTHWEST LOUISIANA
949 RYAN STREET
SUITE E
LAKE CHARLES, LA 70601
(337) 436-0453
FAX: (337) 436-3163

September 12, 2013

Re: Questions and concerns about the proposed Hurricane Barrier for St. Charles and St. John's Parishes and how it will affect our family's business, Cajun Pride Swamp Tours at 110 Frenier Rd., LaPlace LA 70068

To whom it may concern,

Based on the map that was in the Times-Picayune on August 25th 2013 outlining the proposed levee construction, and the attached map provided to me by the LaPlace Zoning Office, it appears that our property is subject to being bisected by the current proposal. My wife and I own P.B. Bayou Charters dba Cajun Pride Swamp Tours which is located at the intersection of Hwy 51 and Frenier Rd. You can see that the proposed levee (in yellow on attached map) will divide our property (outlined in red). As our business consists entirely of providing public tours by boat through our water ways, and the surrounding water ways, we are greatly concerned that the proposed project will dramatically alter the land, waterways, and atmosphere of what our guest have come to enjoy. The following is a list of questions that we have as to how the proposed project may affect our property, business, and livelihood before, during, and after the construction of the levee.

- What is a true timeline of when the project will start?
- Are public hearings being held and/or scheduled to allow input from landowners likely to be affected by the project?
- Is the project, in fact, going to necessitate the use of property that we currently own?
- Can the proposed levee or wall be construction 1 mile closer towards Lake Pontchartrain or along the existing rail road line?
- When, and in what manner, will I be notified as to any planned or proposed use of my property?
- When, and in what manner, will I be notified that any portion of my land will be subject to condemnation?
- What is the timeline on when construction may directly affect my property?
- How long may the project last on our site?
- How wide and tall is the wall going to be through my property?
- Has an Environmental Impact Study been done on how the levee will affect the wetlands and animals in our area and on my land?
- How much materials, equipment, and crew will be placed at our site?
- How much of my land will need to be cleared to make way for the levee or wall?
- Will any of our Cypress trees be cut down or removed from my property?
- Will a wall or levee be placed through our property?
- How will the Corp get the materials to the work site?
- Will the Corp be using my land or water ways during construction?

- Will flood gates be used on all waterways that are being affected by the proposed protection?
- Can the proposed project be pushed closer and along HWY 51 with access to Frenier Rd?
- In what manner may I communicate with the Corp of Engineers with regard to their plan and possible ways to minimize the potential damage to our business?
- In what manner will we be compensated if our buildings and grounds must be raised as a result of the project?
- Will my business be able to operate on our site and have access to our waterways and surrounding waterways, as well as maintain its current frontage to the highway, during the construction of the proposed levee or wall?
- In what manner will we be compensated for any loss of business resulting from project?
- In what manner will we be compensated for loss of land, Cypress Trees removed or cleared, and cost to rebuild the marsh and wetlands that are disturbed?
- Will we be compensated for loss of business due to an inability to conduct tours directly caused by the hurricane protection?

I fear that our family business has been given a death sentence and know it is only a matter of time before the unknown will be upon us. On a personal level, this project has a profound effect on the life of my wife and I, as well as our employees. Below are a few ways this is personally impacting us:

- Stress caused by our daily concerns on what the future has for us as this is all out of our control.
- Stress due to potential loss of revenue and the affect it will have on our employees, future wages, future projections, and future growth as a company.
- Potential loss of vendors and clients due to the uncertainty raised by the project as to the sustainability of our business.
- Stress due to the financial commitment and investment into our property with now has an unknown future.
- Stress due to debt to our vendors that is long term as we only bought the company and property 3 years ago.
- Stress of not knowing if we will have a retirement. This company is our retirement.
- Stress of not knowing if our children will have a future based on our company.

I do want to state that we are not against the proposal for the protected project. We are most definitely in favor of the project and the protection it will give the Tri-Parish. We simply want to raise our concerns, obtain answers, and ensure that all due consideration has been given as to how the project will affect us. We are a mom and pop operation with 15 employees. We are not a large company with high cash reserves and financial backing. Our operation is dependent on access to and use of the wetlands and waterways to conduct our tours. We are not able to relocate our business due to the unique services we offer which include the lands and waterways we own. Since 1990, Cajun Pride

Swamp Tours has been in operation at its site on Frenier Rd. We are a great attraction to St John's Parish and proud to be a part of the community. We love what we do, love our employees, and most all, love the land that we own. What we have, and own, is unique to Louisiana and South Louisiana especially. We hope to be a part of the community for a long, long, time and hope to be able to work with the Parish on this project and have our particular issues and concerns considered by the Army Corp of Engineers.

I appreciate your time and efforts and would love to speak to you in person concerning this matter. We would love to take you on a tour or boat ride to show you our property and address the concerns we have first hand. I can be reached at 504-485-1404 (my cell phone) to discuss this matter.

With kind regards from the bayou!

Paul Bair

Paul Bair

Owner/ manager

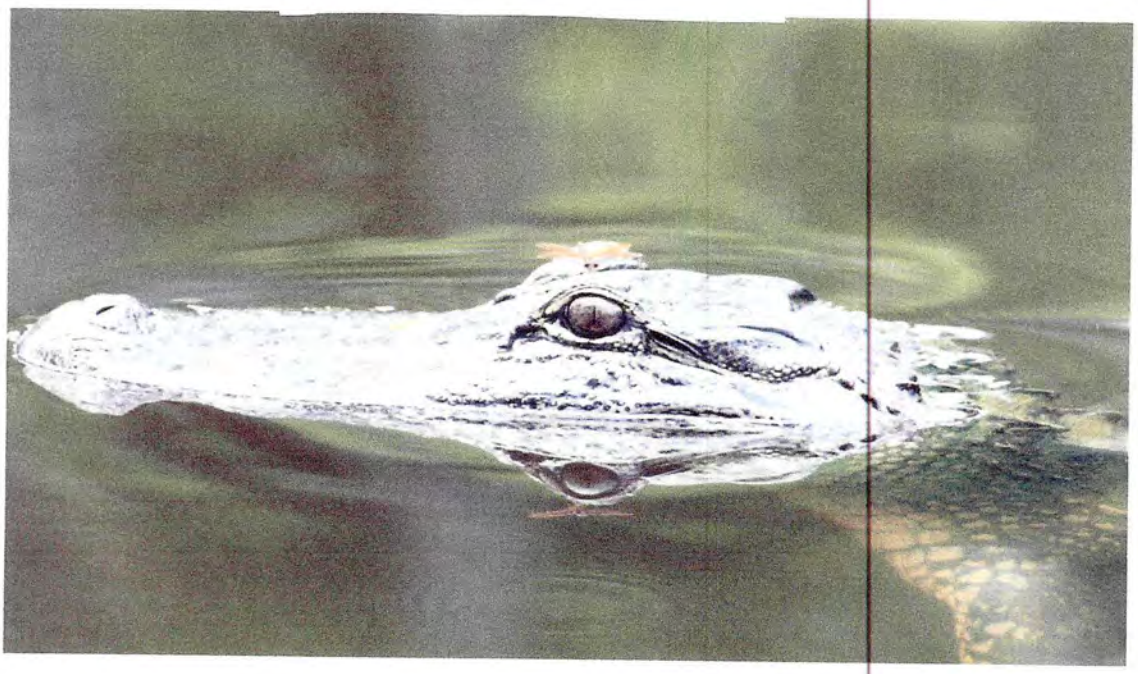
Cajun Pride Swamp Tours

110 Frenier Rd.

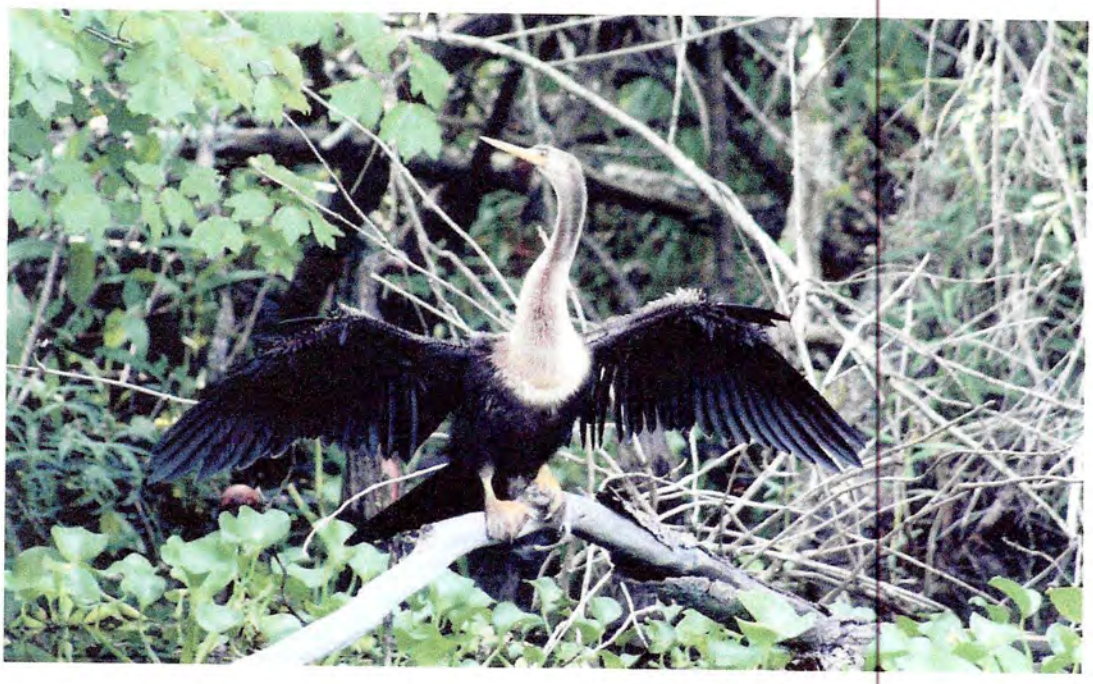
LaPlace LA 70068

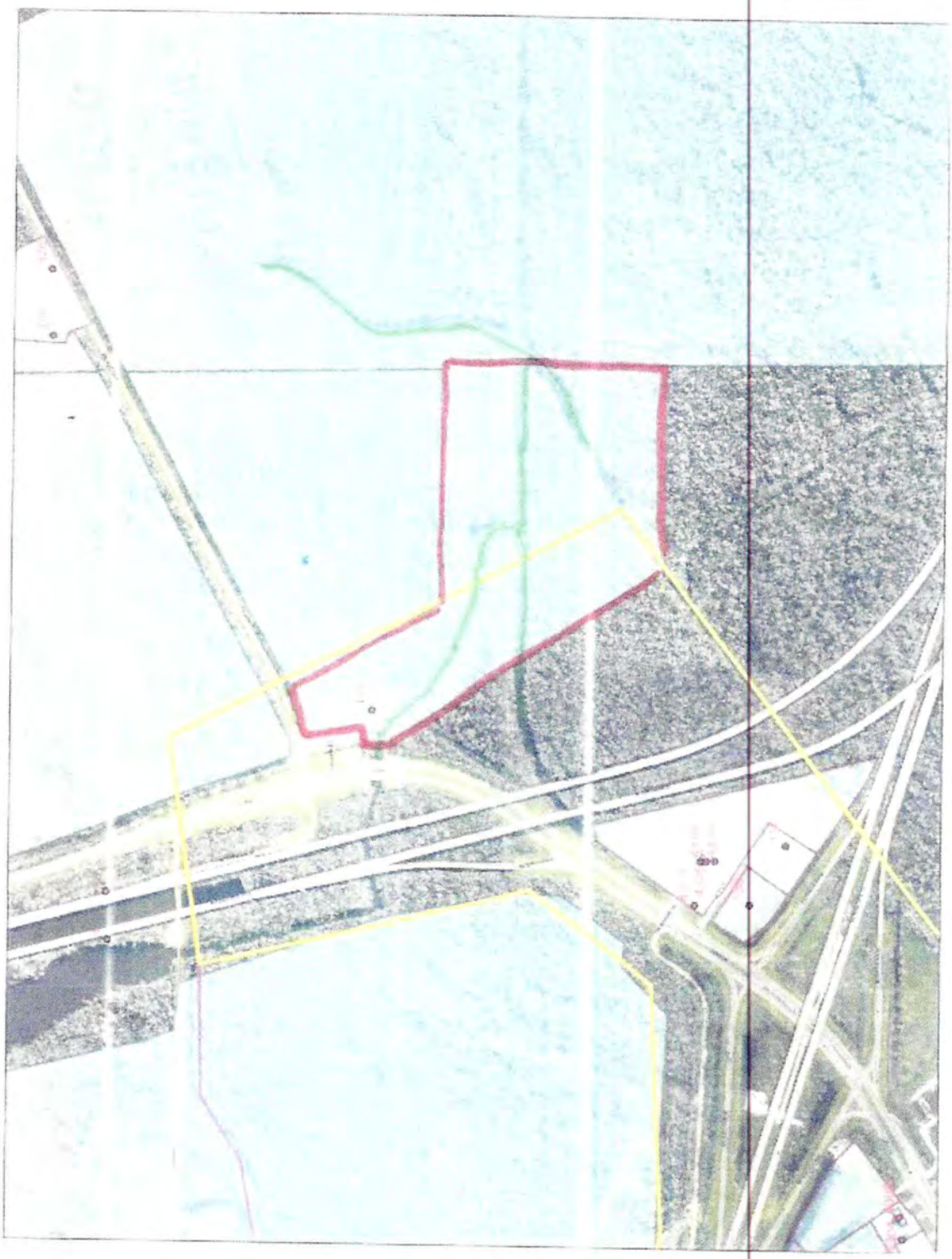
504-467-0758

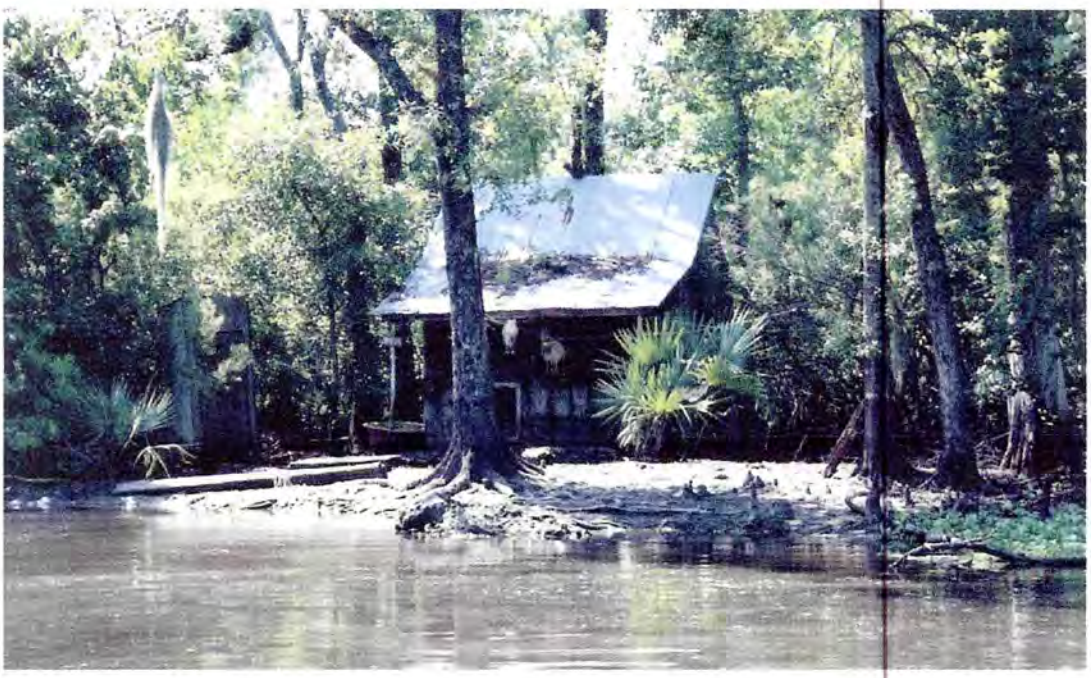
CAJUN PRIDE SWAMP TOURS



Description of Cajun Pride Swamp Tour:
Located at 110 Frenier Road, LaPlace, Louisiana 70068, 800-467-0758







DESCRIPTION OF OPERATION

Cajun Pride Swamp Tours was established at this location in the 1990's to provide swamp tours into the adjacent wetlands and offer an insider look at the untouched and natural beauty of the Manchac Swamp and its inhabitants. Current facilities consist of 3 passenger boats, animal exhibit, ticket office, 8 stall restroom facility, covered and uncovered picnic area, gift shop with over 200 separate items with a swamp and New Orleans flair, and parking for multiple vehicles and or motor coaches. Daily swamp tour operations consist of conducting 1.5 to1.75 hour tours via boat through the waterways, swamps and bayous associated with the private property (55 acres) and wetlands owned and managed by Cajun Pride Swamp Tours. We conduct tours daily at 9:30am, 12:00pm, 2:15pm and 4:15pm with other tour times available upon request. Trips are narrated by USCG licensed captains and tour guides aboard 45-65 passenger custom built tour boats. We cater to local business, New Orleans tourism operators, and wholesalers.

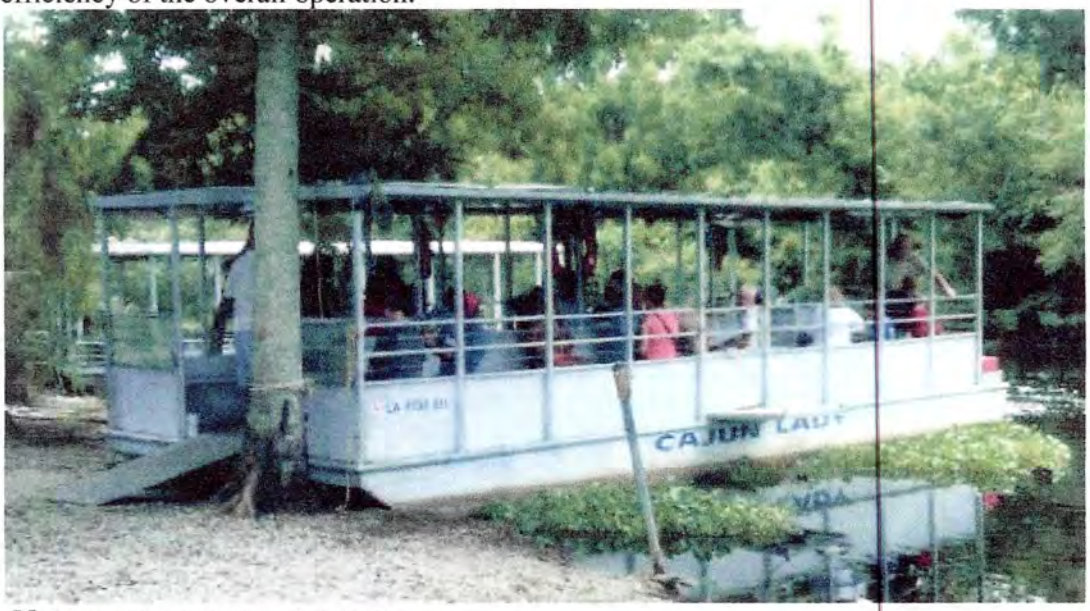
In conjunction with the swamp tour, at times when requested, we can provide catering services for groups. These catered events can be aboard tour boats, or on the premises at the covered picnic area.

COMPANY LOCATION

Our existing swamp tour business, Cajun Pride Swamp Tours, is located at 110 Frenier Road, LaPlace, Louisiana 70068, near the intersection I-10 and Hwy 51, approximately 27 miles west of New Orleans, Louisiana. The tour related facilities are sited on 55 acres of property inland area adjacent to canals that lead into wetland area. Map provided below depict the vicinity and location of the existing swamp tour facilities and the boundary of the Frenier Road, Interstate 55, and Interstate I-10.

USCG CERTIFIED VESSELS

Cajun Pride Swamp Tours consists of our land facilities as well as 3 passenger vessels docked adjacent to our parking site. Below is a list of the vessels associated with our company's daily operation. These boats were constructed with our operation solely in mind. From the draft of the vessels, type of motors used, routine maintenance of the vessels according to USCG standards, as well as company polices, all aspects of the vessels details have taken into consideration the environment, passengers/guests, and efficiency of the overall operation.



55-64 passenger swamp tour boat.

Our New 55-65 passenger tour boat... will be in services starting Oct of 2013

44-49 passenger swamp tour boat.

Swamp tour ticket office and picnic area.....seating for up to 120 guests

New 6 stall, 400 square foot restroom facility.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

October 1, 2013 F/SER46/LA:jk
225/389-0508

Ms. Joan Exnicios, Chief
Environmental Planning and Compliance Branch
New Orleans District, U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Ms. Exnicios:

NOAA's National Marine Fisheries Service (NMFS) has received your letter dated August 23, 2013, transmitting the Integrated Draft Feasibility Report and Environmental Impact Statement (EIS) titled "**West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study**." The U.S. Army Corps of Engineers (USACE) is evaluating alternatives to provide hurricane and tropical storm surge protection to residents in St. Charles, St. John the Baptist, and St. James Parishes, Louisiana.

The Corps has identified Alternative C as the Tentatively Selected Plan (TSP). Alternative C consists of approximately 18 miles of levees spanning from the West Guide Levee of the Bonnet Carré Spillway, along Interstate Highway 10, and terminating at the Mississippi River levee near Garyville, Louisiana. The TSP would directly impact approximately 775 acres and enclose 8,424 acres of forested wetlands and swamp habitats.

NMFS believes there are environmental concerns and requests additional information be included in the Final EIS. The following comments identify areas where additional information is necessary to demonstrate compliance with applicable laws and regulations pertaining to mitigation and the National Environmental Policy Act (NEPA).

General Comments

NMFS does not object to hurricane protection to reduce risk to life or property, or to the proposed levee alignment. However, we find the draft EIS lacks information necessary to demonstrate adverse wetland impacts would be fully offset through the implementation of an adequate mitigation plan. Specifically, adverse wetland impacts are not quantified by the Wetland Value Assessment methodology determined acceptable under USACE guidelines for Louisiana habitats. In addition, the mitigation plan included in Appendix A, Annex K, proposes conceptual mitigation ideas only which also have not been assessed or quantified to determine benefits. Lacking an assessment of impacts and benefits, it is unclear how the USACE can determine wetland impacts would be fully offset in compliance with the Clean Water Act. Lacking an adequate assessment of mitigation benefits, or a discussion which clearly identifies the potential for long term wetland impacts if mitigation is inadequate, it is unclear how the draft

EIS fully complies with NEPA requirements. Finally, the proposed mitigation plan does not have sufficient information to demonstrate compliance with the 12 "items" required by mitigation regulations. This information is necessary for project planning purposes, including alternatives analysis, and equally important for public disclosure of the type and location of the mitigation.

NMFS is concerned the source of more than 3 million cubic yards of borrow material for levee construction is not identified, and associated impacts discussed, in the draft EIS. Unless there is a commitment to not obtain borrow from wetlands or other sensitive habitats, NMFS believes failure to discuss or disclose what could be a significant environmental impact is a violation of NEPA. We encourage the USACE to use non-wetland borrow locations to the maximum extent practicable. If the USACE determines wetland impacts associated with borrow sources are unavoidable, a discussion and quantification of such wetland impacts (and mitigation costs) should be included in a supplemental draft EIS for this project.

While direct wetland impacts have been quantified for the TSP in terms of acreage, NMFS does not agree sufficient information has been provided to demonstrate indirect impacts to more than 8,000 acres of enclosed wetlands would not occur. The draft Adaptive Management and Monitoring Plan has not been finalized, but at present, only includes monitoring of mitigation plan success and corrective actions to be taken if such actions do not result in anticipated benefits. The draft Adaptive Management and Monitoring Plan does not include efforts to evaluate whether project implementation results in adverse impacts to enclosed wetlands. The final EIS should include an Adaptive Management and Monitoring Plan, developed in coordination with the natural resource agencies, which evaluates the impact of levee construction and water control structure operations on enclosed wetlands. NMFS recommends sufficient funds be included in the overall cost projection to sufficiently address adaptive management and monitoring needs for the enclosed wetlands and the mitigation areas.

According to the draft EIS, under both intermediate and high sea level rise scenarios, in 50 years all structures providing drainage between enclosed wetlands and exterior waters would be closed the vast majority of the time. However, no discussion is provided to identify how water levels in enclosed wetlands would be managed. The final EIS should identify and discuss this issue.

Specific Comments

Chapter 2
Section 2.4.5 Essential Fish Habitat

Page 2-24. NMFS agrees project implementation would not adversely impact essential fish habitat (EFH). As such, an EFH assessment is unnecessary. NMFS recommends this section be deleted from the final EIS. Likewise, NMFS recommends Section 4.3.5 also be removed from the final EIS.

Chapter 4
Section 4.3.2 Vegetation Resources

Page 4-12. Wording in the second paragraph indicates Alternative C would directly impact 719 acres of wetlands, while Table 4-2 indicates 775 acres of wetlands would be impacted. The correct numbers should be provided in the final EIS.

We appreciate the opportunity to review and comment on the Integrated Draft Feasibility Report and EIS. If you have questions regarding comments provided above, please direct your questions to Lisa Abernathy at lisa.abernathy@noaa.gov or by phone at (225) 389-0508, extension 209.

Sincerely,

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

c:
FWS, Lafayette, Walther
EPA, Dallas, Keeler, Ettinger
LA DNR, Consistency, Haydel
F/SER46, Swafford
F/SER4, Rolfes
Files

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

October 24, 2013

Colonel Richard L Hansen
District Commander
U.S. Army Corps of Engineers
New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Colonel Hansen:

In accordance with our responsibilities under Section 309 of the Clean Air Act, the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations for implementing NEPA, and Section 404 of the Clean Water Act (CWA), the U.S. Environmental Protection Agency (EPA) Region 6 office in Dallas, Texas, has completed its review of the US Army Corps of Engineers' (Corps) West Shore Lake Pontchartrain (WSLP) Hurricane and Storm Damage Risk Reduction Study Integrated Draft Feasibility Report and Environmental Impact Statement (Draft EIS). The Corps examines potential solutions to reduce damage from hurricane and tropical storm surge for residents in St. Charles, St. John the Baptist, and St. James Parishes, Louisiana, and identifies a tentatively selected plan (TSP).

Based on our review, the EPA is rating the Draft EIS as **"EC-2" (Environmental Concerns - Insufficient Information**[1]). While EPA supports the Corps' new SMART planning process as a means to expedite and focus the planning and review process for water resources projects, we believe that additional information should have been provided in the Draft EIS.

We appreciate the Corps' efforts to streamline the planning and review process, such as the Corps' SMART planning process, however EPA believes there is important information lacking in the Draft EIS. Using this process, the Corps has integrated the environmental analysis in a shortened draft Feasibility Report and EIS. We believe the Corps can use this approach to provide concise, accessible NEPA documents that succinctly disclose the potentially significant impacts of project alternatives. EISs that are more readable can both improve the decision making process and help inform and engage the affected public. With regard to this Draft EIS, our specific concerns focus on the nature and extent of the direct, indirect and cumulative adverse environmental impacts associated with the TSP, Alternative C, and the lack of information in the Draft EIS assessing those effects. The Draft EIS also does not effectively assess the potential environmental impacts of alternative levee alignments. Such information is essential for making an informed decision regarding the environmental acceptability of the alternatives under consideration. Using the SMART planning approach, the Corps is selecting a

[1] Please see http://www.epa.gov/compliance/nepa/comments/ratings.html for more information on EPA's rating system.

preferred alternative prior to conducting sufficient environmental impact assessment on other reasonable options

The EPA recognizes the vulnerability of the WSLP study area to storm surge flooding and supports implementation of hurricane risk reduction measures in the WSLP study area. We are also committed to working with you and other stakeholders to restore the Louisiana's coastal ecosystem and ensuring its vibrant environmental and economic future. However, as you move toward a final decision for this project, EPA believes it is essential that the planning effort consider more fully the means to avoid, minimize, and mitigate environmental impacts, particularly with respect to coastal wetlands.

As currently proposed, the proposed levee would enclose over 16 square miles of wetlands, and the Draft EIS provides limited information on how that enclosure will affect the functions and values of these wetlands. While the Draft EIS indicates that the levee would be constructed to maintain hydrologic connectivity between the enclosed wetlands and the surrounding swamps, and Lakes Maurepas and Pontchartrain, detailed information on this critical project feature is not provided. Instead, the Draft EIS only provides a general statement that hydrologic connectivity would be maintained by constructing culverts with sluice gates in the new levee to join with existing culverts under Interstate 10, with no supporting detailed information on the locations and design of these new culverts. The Draft EIS also reports that preliminary modeling shows only "minimal changes to flows" (p. 4-14), with no additional details on how that modeling was conducted or the results (although the Draft EIS does present the results for modeling at one location, showing a 25% reduction in flows (p. 4-1)). EPA believes it is essential that the Final EIS more fully describe and demonstrate how hydrologic connectivity will be maintained. Moreover, the Final EIS should include an assessment of the potential for relative sea level rise to result in an increase in the closure frequency of the gates and culverts. Other Corps levee studies in Louisiana have shown that such increased frequency of closure can convert an open levee system into one that is increasingly closed, resulting in potentially significant adverse environmental impacts.

The EPA is also concerned that the Draft EIS does not consider measures to restrict development on wetlands enclosed behind the levees. The Feasibility Report indicates that Alternative C was tentatively selected, in part because these enclosed wetlands would reduce the residual flood risks due to floodwater overtopping the levee. This would allow floodwaters to fill these wetlands first before inundating populated areas. Considering this concern, EPA recommends the purchase of non-development easements and/or the implementation of local flood zoning ordinances to limit development in these areas. Moreover, the Draft EIS does not provide information regarding alternative locations for the source of the levee-building material should the primary source not be sufficient. EPA recommends additional information regarding alternative borrow sites, as well as the development of site selection criteria to ensure that sites with wetlands and/or bottomland hardwoods are not used. Finally, EPA is concerned that the Draft EIS provides limited information regarding potential mitigation measures to compensate for wetland losses, and does not provide information to demonstrate compliance with the Clean Water Act Section 404(b)(1) Guidelines (especially the Guidelines' requirements that proposed discharges of dredged or fill material must be the least environmentally damaging practicable alternative).

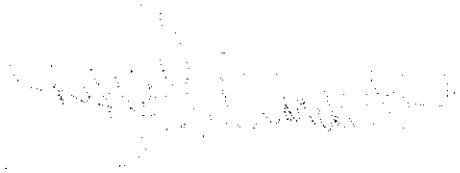
EPA has enclosed detailed comments on these and other issues that we hope will assist you in your continued efforts to address the important procedural and environmental issues surrounding this proposed project. EPA believes its concerns about the project's potential impacts and the analysis of impacts can be resolved in a timely manner and we look forward to working with you collaboratively on these important issues.

Please send our office one copy of the Final EIS and a web link or CD when it is filed electronically with EPA through e-NEPA. If you have any questions, please contact me at 214-665-8126 or my staff Rhonda Smith of my office at 214-665-8006 or by e-mail at smith.rhonda@epa.gov.

Sincerely,

Debra A. Griffin
Associate Director
Compliance Assurance and
Enforcement Division

Enclosure



DETAILED COMMENTS
ON THE
WEST SHORE LAKE PONTCHARTRAIN HURRICANE STORM
DAMAGE RISK REDUCTION STUDY
INTEGRATED DRAFT FEASIBILITY REPORT AND
ENVIRONMENTAL IMPACT STATEMENT

CLEAN WATER ACT SECTION 404(B)(1) GUIDELINES

The Corps has identified Alternative C as the tentatively selected plan (TSP) prior to determining whether it complies with the Clean Water Act Section 404(b)(1) Guidelines (Guidelines). The Guidelines require that discharges of dredged or fill material be the least environmentally damaging practicable alternative. However, based on information in the Draft EIS, Alternative A appears to be significantly less environmentally damaging than Alternative C. Alternative A would result in direct impacts, i.e., filling to create the new levee, to approximately 376.55 acres of wetlands, whereas Alternative C would have direct impacts to 775.13 acres of wetlands. Alternative C also has a substantially greater potential for indirect wetland impacts. Alternative A would enclose approximately 5 square miles of wetlands, whereas Alternative C would enclose approximately 16 square miles of wetlands. Alternative A provides annual benefits equivalent to Alternative C and protects the same number of properties, the same communities, and the same length of highway. According to Table 3-3, the estimated implementation costs of these alternatives are roughly equal. Alternative A would cost approximately $887.6 million, whereas Alternative C would cost $880.9 million. At least in terms of cost, Alternative A would appear to be practicable. EPA recommends the Final EIS provide an evaluation of how the TSP would comply with the Guidelines' requirements.

RESIDUAL RISK AND ENCLOSED WETLANDS

With respect to safety, the Corps has found that Alternative A "risks immediate inundation of developed areas in an overtopping event…", given that portions of this levee alignment would be adjacent to existing development. (Section 3.7, Page 3-11) In contrast, Alternatives C and D would place large wetland areas between the proposed levee and developed areas, thereby providing floodwater storage if the levee were overtopped. It appears the Corps views the enclosure of wetlands behind a levee as a significant project benefit with respect to residual risk and safety. At the same time, however, the Draft EIS acknowledges that wetlands enclosed within the proposed levee could be adversely impacted due to altered hydrology. The decision to view the enclosure of wetlands as an important part of a risk reduction project could lead to further loss and degradation of coastal wetlands.

Based on our review of the Draft EIS, it is unclear to what extent the residual risks associated with each alternative were analyzed and quantified. EPA recommends clarifying this issue, including examining ways to further reduce residual risk associated with Alternative A (e.g., by elevating properties inside the levee system and/or increasing internal pumping capacity), calculating how much undeveloped land would need to be included within the levee system in order to adequately reduce residual risk, and determining the amount of wetland area

that would adequately mitigate residual risk and providing technical evidence to support the findings.

Wetlands enclosed within a levee system are at increased risk of being converted for development purposes. Such induced development would add to cumulative wetland losses, reduce flood storage capacity, and increase properties at risk. However, the Draft EIS does not evaluate the potential for induced development in enclosed wetlands. Moreover, the Draft EIS does not describe how enclosed wetlands would be protected from future development. If enclosed wetlands are determined to be a necessary residual risk reduction feature in order to maintain the appropriate level of public safety, EPA recommends these wetlands be permanently protected by acquisition or conservation servitude.

ESTIMATES OF MITIGATION COSTS

By making a TSP selection using a limited environmental assessment, the Corps may have excluded relevant mitigation costs. For the WSLP study, the Corps is proposing to include environmental structures to maintain hydrologic connectivity between enclosed and flood-side wetlands. The number, locations, and sizes of these environmental structures are critical for minimizing potential indirect impacts to wetlands. In that regard, the Draft EIS states that "[h]ydrologic information is limited, so estimates were not developed to evaluate the number of environmental structures that would be required for the alternatives" and adds that such information could "greatly increase the cost" associated with an alternative. (Section 3.7, Page 3-13). We recommend that the Final EIS estimate the number of environmental structures needed for each alternative in order to more accurately calculate and compare benefit-to-cost ratios. The Draft EIS also states that "[a]t this stage, mitigation costs for indirect impacts remain uncertain due to limited hydrologic information and lack of a full wetland value assessment". (Section 3.6, page 3-10) We recommend the Corps consider whether limitations in the assessment of potential wetland mitigation costs could be significant relative to the benefit-to-cost ratios for each alternative.

The selection of Alternative C as the TSP is in part based on the Corps finding that it maximizes net project benefits. According to the Draft EIS, Alternative A would provide a 1.48 benefit-to-cost ratio, while Alternative C would provide a 1.63 benefit-to-cost ratio. Given information limitations pertaining to environmental structures, adverse impacts, mitigation, and other factors, we recommend that the Corps re-evaluate the benefit-to-cost ratio.

ASSESSMENT OF ENVIRONMENTAL IMPACTS

According to the Draft EIS, borrow material for this project would come from the Bonnet Carré Spillway or alternative borrow sources not yet identified. Potential borrow pits will be identified during the feasibility- level design of the TSP alignment. During the Preliminary Engineering Design phase of the project, identification and environmental clearance of these pits will be finalized and right of way drawings will be prepared in anticipation of submitting a request to obtain the necessary real estate rights-of-way. As was done for the Greater New Orleans Hurricane and Storm Damage Risk Reduction System, we would strongly encourage the Corps to use non-wetland borrow locations to the maximum extent practicable. Should the

Corps determine that wetland impacts associated with borrow sources are unavoidable, an estimate of such potential wetland impacts (and mitigation costs) should be included in the Final EIS for this project. Other Corps levee NEPA documents in coastal Louisiana have identified specific locations for borrow material including the programmatic EIS for Morganza and the numerous reports prepared for the expedited NEPA process on the post-Katrina New Orleans levee upgrades. Regardless of the language in the appendix, the Draft EIS clearly states that the Corps retains the option to use undisclosed locations with undisclosed impacts. Borrow site wetland impacts can be significant. This is a major deficiency in the impact analysis for WSLP.

An effective assessment of potential indirect wetland impacts is essential to the environmental review of this proposed project. As noted above, limited hydrologic information was used in designing the proposed levee alternatives and estimating potential indirect wetland impacts. The Corps has correctly acknowledged the potential for indirect impacts to enclosed wetlands and has attempted to quantify these impacts in the Draft EIS. However, the effort to do so with limited information highlights the remaining uncertainty regarding this critical component of the WSLP study. For example, it is unclear how the Corps estimated an indirect habitat reduction of 15% for enclosed wetlands.

According to the Draft EIS, hydrologic modeling indicates that the proposed levee could cause a 25% reduction in interchange between floodand protected-side wetlands in at least some portion of the enclosed area. (Section 4.1.1, Page 4-1) It is unclear how this estimate was determined without first specifying the number of how many environmental structures would be constructed. It is also not clear how this modeling result relates to the assumed 15% habitat reduction discussed above. Nevertheless, a 25% reduction in hydrologic exchange would have substantial adverse impacts to the enclosed wetlands, and is not consistent with statements that hydrologic connectivity would generally be maintained between enclosed wetlands and the surrounding swamp. We would also note that this estimate of reduced exchange does not include potential future increases in environmental structure closure due to the combined effects of sea level rise and subsidence.

The assessment of potential indirect wetland impacts does not include an analysis of potential increases in the frequency of environmental structure closures due to relative sea level rise (RSLR) over the life of the project. The Corps has determined that the environmental structures would be closed approximately 8.5 days per year and would otherwise remain open to minimize hydrologic disruption. These closures would occur when water levels outside the levee system meet a certain elevation (or risk) threshold. As has been noted in other Corps levee studies, RSLR can lead to a significant increase in the number of days that such a threshold is met and the environmental structures are closed. Structures originally designed to maintain hydrologic connectivity between enclosed and flood-side wetlands would be increasingly closed, further impounding and isolating interior wetlands.

In this regard, there are similarities between this project and the Corps' Morganza to the Gulf levee system. Both would enclose large wetland areas and include environmental structures intended to reduce hydrologic disruption. In response to comments by EPA and others, the Revised Programmatic EIS for the Morganza to the Gulf system includes the finding that under certain RSLR scenarios, increased closure frequency could have significant adverse impacts to

wetlands, fisheries, and water quality. Despite acknowledging these environmental risks in the Morganza to the Gulf study, the Draft EIS for the WSLP study does not include a similar analysis.

According to the Draft EIS, the data used by the Corps to assess the wetland quality in impacted areas is derived from two monitoring stations (one of which did not provide complete information relative to salinity and/or water levels). We believe this limited data is not sufficient to evaluate potential impacts, especially given the relatively large area of wetlands that would be enclosed, the complexity of assessing indirect wetland impacts, and the importance of minimizing wetland losses. In addition, the tool used for this assessment is based on herbaceous vegetation whereas the vast majority of the potentially enclosed wetlands are forested. The Draft Feasibility Report and EIS acknowledges that this approach is "not ideal", and commits to conducting a full feasibility-level habitat analysis at a later point. (Section 4.3.2, Page 4-14)

The Draft EIS states that the "project would provide for the protection of protected side wetlands, potentially extending their lifespan and their water quality functions" (Section 4.1.3, Page 4-4). No data is provided to support this assertion, which is contrary to statements elsewhere in the document regarding potential adverse impacts to enclosed wetlands. The Draft EIS further states that closure of the levee system during storms "could provide some reduction of the potential ecological stresses associated with saltwater intrusion..." While we fully recognize that portions of the Maurepas Swamp have been stressed by salinity, it is unclear, based on the limited available data, whether this is the case for the portion of the swamp that would be enclosed by the proposed levee. We recommend that the Final EIS provide additional data and analysis to support this conclusion that the proposed levee could benefit enclosed wetlands.

CONSISTENCY WITH OTHER COASTAL RESTORATION EFFORTS

The Draft EIS correctly acknowledges that impoundment (via roads, railroad embankments, and spoil banks) is a cause of wetland decline in the study area. Pursuant to the Water Resources Development Act of 2007, the Corps developed a feasibility study and supplemental EIS for a project that would gap existing spoil banks in the Maurepas Swamp. This project, the Amite River Diversion Canal Modification, is designed to partially undo hydrologic disruption caused by a spoil bank along the Amite River Diversion Canal. The scientific basis for this modification project is the known potential for artificial linear features to cause indirect adverse impacts to wetlands and other aquatic resources. Thus, the Corps has both acknowledged the damage to wetlands caused by artificial hydrologic barriers and proposed measures to partially undo such damage in the Maurepas Swamp. At the same time, however, Alternative C would impound approximately 16 square miles of Maurepas Swamp wetlands (these areas are already partially impounded by Interstate 10). We recommend that the Final EIS clearly describe how the proposed WSLP levee would be consistent with the Corps' efforts to undo hydrologic disruption and impoundment elsewhere in the swamp.

AIR QUALITY IMPACTS

Chapter 2 of the Draft EIS states that air quality for the three parish area (St. Charles, St. John the Baptist, and St. James, Louisiana) is in attainment of all National Ambient Air Quality

Standards and a general conformity determination is not required, and therefore air quality will not be further discussed. EPA believes it is especially important that information regarding the potential air quality impacts during the any construction phase of the project and related mitigation measures are fully discussed (i.e., mitigation measures for Particulate Matter (PM)/dust control, air quality impacts of construction vehicles etc.)

As presented on Page 3-7 of Chapter 3, Alternative A construction would require roughly 3,100,000 cubic yards of earthen borrow material; 3,700,000 yards of geo-textile fabric; 30,000 cubic yards of aggregate limestone road; nearly 5,000 linear feet of T-walls to cross under the interstate; 1,200 linear feet of flood gates; railroad gates and pump stations. Given the enormous amount of construction activities associated with the project, EPA asks that the Final EIS fully discuss air quality impacts related to potential construction activities for the project/plan study area.

EPA also recommends the use of best management practices (BMP)s for PM_{10} and fugitive dust control (e.g., gravel roads, soil wetting practices, limiting access, traffic and speed reduction). To further reduce potential air quality impacts, the responsible agencies should also include a Construction Emissions Mitigation Plan (Plan) and adopt this Plan in the Record of Decision (ROD). The Final EIS should discuss specific actions including dust ordinances on the parish level, educational outreach tools, and tools to minimize the residents' exposure to PM_{10} for St. Charles, St. John the Baptist and St. James Parishes, as applicable. In addition to measures included in the Draft EIS and applicable local, state, or federal requirements, EPA recommends that mitigation measures (as applicable) be included in the Plan in order to reduce impacts associated with emissions of PM, and other pollutants from any planned structural and non-structural activities, and possible future modifications to the roadway system. Specific information on mobile and stationary source control can be found at: http://www.epa.gov/otaq/nonroad-diesel.htm; http://www.epa.gov/ttncatc1/dir1/finepmtech.pdf

GREENHOUSE GAS (GHG) EMISSIONS

The EPA recommends the Final EIS include an inventory of GHG emissions associated with construction of the proposed project.

CLIMATE CHANGE

Given the emphasis by the President in appropriately addressing climate change, including rebuilding infrastructure, EPA recognizes the importance of the Draft EIS's consideration of how climate change could potentially influence the proposed project in terms of its effectiveness over time in reducing flood risk. By including and considering additional analysis regarding potential indirect impacts, the Corps can help ensure the region is rebuilt in a way that makes it more resilient and better able to withstand future storms and other risks posed by a changing climate.

EPA looks forward to continuing to work with the Corps of Engineers and incorporate the President's climate change adaptation goals, strengthening the resiliency of our coastal communities, and addressing the nation's pressing infrastructure needs.

ENVIRONMENTAL JUSTICE ISSUES

Section 2.3.8 of the Draft EIS is not clear whether locations outside the protection of the levee system would experience induced flooding and whether any of these locations would be identified as having potential environmental justice concerns. Additionally, the Draft EIS is also not clear in specifying what the additional outreach methods include and whether they have occurred (p. 2-15). Information on percent minority and percent low income populations was absent from Table 2-12 for Garyville, Louisiana.

According to Section 6.20, one public meeting was held specific to environmental justice issues on May 21, 2013 in Lutcher. The Draft EIS does not provide information as to what issues were identified at this meeting or who attended. The Draft EIS also does not indicate whether there were outreach efforts in Reserve, Louisiana which was identified in the Draft EIS as a potential environmental justice concern in Section 2.3.8.

EPA recommends that the Final EIS 1) clarify the information for Garyville in Table -12, 2), clarify outreach methods listed in 2.3.8, particularly for Reserve, Louisiana, and 3) describe the issues and attendees at the May 21, 2013 public meeting. EPA also requests that the Corps clarify whether there are locations outside the protection of the levees that would experience induced flooding because of their construction and whether these locations have potential environmental justice concerns.

ENVIRONMENTAL JUSTICE REFERENCE COMMUNITIES

The reference communities used in the analysis are comprised of extremely high percentages (61% for St. John Parish) of minority populations (Tables 2-10, 11, and 12). This appears to artificially dilute the representation of minority populations. Furthermore, the reference communities are not large enough to provide an accurate reference. For example, in St. John Parish, almost the entire reference community (total pop of 45,824) is comprised of the towns being analyzed (total pop of 42,449). They are essentially comparing the towns to themselves, not to a reference community. We recommend choosing alternative reference communities for inclusion in the Final EIS.

ENVIRONMENTAL JUSTICE ANALYSIS METHODOLOGIES

Section 2.3.8 of the Draft EIS uses the 50% analysis for minority population identification, but not the meaningfully greater analysis. CEQ guidance explains that minority populations should be identified where either the 50% or meaningfully greater analyses are met, not 'either or' EPA recommends the Final EIS provide an explanation for the use of a 20% greater threshold for the identification of low-income populations and also what constitutes 'low-income', e.g. individuals below Census poverty threshold, etc.

The fact that the majority of the study area is comprised of racial or ethnic minorities should not negate the existence of disproportionate impacts, as the Draft EIS appears to

conclude. (Section 2.3.8) A majority minority population study area may indicate that impacts are disproportionately falling on minority populations. Please clarify in the Final EIS.

The Environmental Justice analysis of impacts from the various alternatives is limited. Analysis of Alternative C states that incremental direct and indirect impacts would result in cumulative impacts to environmental justice populations, but does not describe what these impacts might be or analyze any mitigation measures to address these impacts. Also, the existing discussion of direct and indirect impacts is limited (Section 4.2.8). Please clarify in the Final EIS.

Section 4.2.8 of the Draft EIS states, that for Alternative C, properties in environmental justice communities eligible for acquisition may contribute to impacts on community cohesion due to the removal of a portion of the population. The Draft EIS then states that this population removal could potentially cause the collapse of the entire community. No further explanation or details are provided in the EIS regarding this issue. If these impacts do not similarly apply to the affected general population, then it appears they could be disproportionately high and potentially adverse. The EPA recommends further discussing this potential and, if necessary, considering appropriate mitigation measures in the Final EIS.

ENVIRONMENTAL JUSTICE MITIGATION MEASURES

Mitigation measures for impacts to environmental justice populations are not discussed. Section 2.3.8 of the Draft EIS identifies two communities that qualify as environmental justice communities; Lutcher and Reserve. The Draft EIS proposes further outreach efforts to these communities. While further outreach is appropriate, it is not sufficiently discussed. EPA recommends the Final EIS identify appropriate mitigation measures for these potential impacts.

TRIBAL RESOURCES

Information in the Draft EIS indicates that Corps identified tribes that may potentially be affected by the proposed action. The Draft EIS also describes that government to government consultation as well as National Historic Preservation Act (NHPA) consultation with interested tribal governments is occurring or will occur. EPA recommends that complete descriptions of government to government and NHPA consultation activities be incorporated in the Final EIS, including correspondence to and from Tribal governments and other consultation-related documents. These documents would demonstrate fulfillment of Tribal consultation duties by the Corps and show the level of Tribal government engagement in both processes.

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
1001 Indian School Road NW, Suite 348
Albuquerque, New Mexico 87104

TAKE PRIDE IN AMERICA

ER 13/572
File 9043.1

September 26, 2013

VIA ELECTRONIC MAIL ONLY

Dr. William P. Klein, Jr.
U.S. Army Corps of Engineers
New Orleans District
PO Box 60267
New Orleans, Louisiana 70160-0267

Dear Dr. Klein:

The U.S. Department of the Interior has reviewed the Integrated Draft Feasibility Report and Environmental Impact Statement for "West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study." The study, authorized by resolutions adopted by the U.S. House Committee on Public Works on July 29, 1971, and the U.S. Senate Committee on Public Works September 20, 1974, determines the feasibility of providing Federal hurricane protection to the western shore of Lake Pontchartrain. The following comments are submitted in accordance with the National Environmental Policy Act of 1969 (83 Stat. 852, as amended; 42 U.S.C. 4321 et seq.), the Migratory Bird Treaty Act (MBTA, 40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), and the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The Tentatively Selected Plan (TSP) is Alternative C, which is also the National Economic Development (NED) plan. Alternative C begins at the west guide levee of the Bonnet Carre Spillway and extends to Hope Canal where it turns south and terminates near the Mississippi River Levee. It is approximately 18.27 miles long and includes four pump stations. It would also require environmental control structures (culverts with flap gates) along the length of the alignment that would be operated during hurricane and tropical storm surge events. Borrow material would come from the Bonnet Carre Spillway or other alternative borrow sources not yet identified.

Construction of Alternative C will result in the direct loss of approximately 775 acres of swamp and bottomland hardwoods (BLH) and encloses 8,424 acres of swamp habitat for a total of 9,199

acres of direct and indirect impacts (Table 1). Although Alternative C has a greatly reduced number of total impacted acres compared to Alternative D (57,343 acres), it is still significantly greater than Alternative A (3,941 acres).

Table 1. West Shore Lake Pontchartrain Acres Impacted

Alternative	Direct Acres	Indirect Acres	Total Acres
Alternative A	377	3,564	3,941
Alternative C	775	8,424	9,199
Alternative D	1,115	56,228	57,343

General Comments

To maintain hydrologic exchange/connectivity between the protected (interior) and non-protected (exterior) side wetlands, culverts are proposed to be included within the levee system. Currently, these measures have not been fully developed and there is still uncertainty and debate on whether maintaining existing flow/exchange can be achieved. Interior drainage modeling (including rainfall) has not yet been conducted to determine if the proposed levee would increase the depth, duration and frequency of interior swamp inundation. The preliminary modeling on tidal exchange, which is not a driving factor for these swamps, showed some reduction in exchange between the interior and exterior wetlands and a slight lag time in the timing of tidal flows comparing the future without project (FWOP) and future with project (FWP) scenarios. If the proposed levee increases flood frequency and water depth, the bald cypress swamp will become further stressed which could result in a reduction in diversity, productivity, and vigor (Krauss et. al. 2009). Therefore, the U.S. Fish and Wildlife Service is concerned that the proposed levee may have deleterious effects on the interior swamp. The impacts to interior wetlands may be more greatly exacerbated with increased Sea Level Rise (SLR) because the hydrology would rely on a pumped system. The potential wetland habitat impacts to the largest remaining continuous forested wetlands in Louisiana would result in the reduction of resident fish and wildlife, reduced important wintering habitat for waterfowl and other migratory birds that use the Central and Mississippi Flyways, and reduced nursery habitat and detritus input important to the maintenance of estuarine-dependent fish and shellfish production

In addition to the impact to water exchange in the protected-side swamp, the FWS is concerned about reduced future water exchange due to SLR requiring increased structure closures. The frequency and duration of gate closures is expected to increase due to area-wide stage increases caused by relative SLR thereby leading to potential substantial affects to wetlands enclosed by the levee system. These potential impacts have not yet been fully determined but are expected to be analyzed during the remaining feasibility phase of the study. By the end of the period of analysis (i.e., 50 years), under the high SLR scenario, all gates could be closed all of the time, similarly under the intermediate SLR scenario there may be almost complete structure closures. At present, it is unknown how water levels within the system would be managed so there is a potential for substantial additional indirect impacts to swamp and fish and wildlife resources to occur. Even with SLR we do not anticipate a corresponding increase in salinities; reasons for this assumption are addressed in our first specific comment.

Developmental pressures on enclosed forested wetlands would likely increase with levee construction due to the reduced threat of flooding in the area but that would also be dependent on the proposed operation of pumps. According to the Corps Civil Works Program Five-Year Development Plan for Fiscal Year 2011 to Fiscal Year 2015, national flood damages are increasing and that is attributed to population migration to the coasts and development of floodplains, thus creating an apparent contradiction between flood damage reduction investments and national flood damages (Corps of Engineers, 2011). Stimulated development of the protected-side wetlands would not be consistent with the Corps of Engineers' plan to reduce flood damages and also utilize this area for flood storage capacity during storms exceeding the project design. Another apparent inconsistency between programs is the planning of restoration projects at the same time levees are being proposed to enclose floodplain habitat and permits are issued for development in these floodplains. More consistency between these programs needs to address the conflicting approaches between restoration and future development. Therefore, the Corps and local sponsor should acquire adequate protection of the enclosed wetlands to ensure and maintain preservation of those areas in perpetuity via the purchase of non-development easements and local flood zoning ordinances.

Opinions expressed at public meetings indicate there is wide spread local support for selection of Alternative D as the recommended plan. Alternative D is a westward extension of Alternative C ending at the non-federal Laurel Ridge levee in Ascension Parish if Alternative D is selected. Not only would the negative effects of Alternative C listed above be realized, but there would be substantial more wetlands (over 57,000 acres) impacted. Since Hurricane Katrina, the FWS and other state and federal agencies have indicated the need to integrate restoration and protection in coastal Louisiana. Two diversion restoration projects that would restore swamps would be enclosed within Alternative D, thus creating a direct and indirect conflict between restoration and protection if Alternative D were chosen. The FWS feels the integration of restoration and protection is important and believes that Alternative D would not realize this goal but rather would hinder it. In addition, the FWS feels a better use of the wetlands outside of Alternative C would be for restoration. Though Alternative C is not ideal, it achieves the goal of protection with fewer impacts to restoration to a far greater extent than Alternative D. The FWS provided an October 2013 Planning Aid Letter to the Corps that presented environmentally less damaging alternatives to Alternative D. The FWS acknowledges that impacts from our proposed alternatives are greater than Alternative C and potential impacts to proposed restoration projects would still exist. However, our alternative equates to less impacts than those anticipated to occur with implementation of Alternative D. If Alternative D is further evaluated, the FWS recommends that equal consideration and analysis be given to our suggested alternative alignment/approaches to D.

Saltwater intrusion (i.e., salinity associated with normal tidal cycles and not with tropical storms) as an issue is raised throughout the draft report. Please see our first specific comment regarding salt water intrusion within the project area.

Given that design and evaluation of most project features has been at a programmatic level, the FWS cannot fulfill its Coordination Act responsibilities at this time. The FWS recommends that further evaluation be conducted and another Draft Report be released to the public to allow review and comments on the feasibility level design of this project.

Specific Comments on the Integrated Draft Report

Page 2-18-19, Section 2.4.2 Vegetation Resources: The second paragraph of this section states that the "existing…swamp habitats…are rapidly converting to fresh marsh and shallow open water habitats due to impounding, saltwater intrusion, and a lack of nutrient and sediment inputs." The less than optimal conditions of the forested wetlands are primarily due to a lack of sediment and nutrient inputs. Although area swamps are not in optimal condition, they are also not "rapidly" converting to fresh marsh and shallow open water. Much of the Maurepas Swamp has experienced varying levels of degradation due to being virtually cut off from any freshwater, sediment, or nutrient input. With minimal sediment and nutrient inputs and moderately high subsidence there is a lack of recruitment and reduced growth Though salinity spikes may be a final detrimental factor in an already degraded system for some of the Maurepas Swamps, according to Coastwide Reference Monitoring System (CRMS) stations in and near Alternative C, data clearly demonstrates that over the past 5 years (2008-2013) saltwater intrusion is not an existing issue for interior Alternative C swamps even though it is also listed as a concern in the Future Without-Project Conditions and water levels are increasing due to SLR and subsidence. The CRMS data also indicates that the interior swamp of Alternative C is not in as poor condition as the area to the west (interior of Alternative D) or especially farther north and near the lake rim. The Integrated Report does not account for the recently constructed Mississippi River Gulf Outlet (MRGO) closure which reduces salinities in the Pontchartrain Basin. The potential for saltwater intrusion is based generally on trends in areas other than in the swamps surrounding Alternative C. With the closure structure in place, proposed restoration projects, and the existing data on salinity it is debatable to what extent salinity will become a problem in the future even with low or intermediate and to some extent high SLR. To date, no modeling has been done to predict future salinity levels for project planning purposes. The FWS recommends the removal of language that indicates a benefit of this project will be to prevent saltwater intrusion and to clarify the primary factors impacting forested wetlands in the study area.

Page 3-2 and 3-2, Section 3.3 and 3.4 Management Measures Considered and Screened and Initial Array of Alternatives (respectively): The FWS provided a Planning Aid Letter (dated October 2013) that requested alternatives to Alternative D be considered (see enclosure) that were less environmentally damaging. To date the Corps has not formally acknowledged consideration of these alternatives. If alternative D is further evaluated, the FWS recommends that equal consideration and analysis be given to our suggested alternative alignments/approaches to D.

Page 4-19, Section 4.36 Threatened and Endangered Species: Because this section also addresses species protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, we recommend that the title be revised to reflect these other protected species.

Page 5-5, Section 5.3 Mitigation Plan: The report acknowledges that implementation of the TSP requires compensatory mitigation for unavoidable project-induced impacts. The FWS recommends further development of the appropriate mitigation to include minimizing and/or avoiding impacts to wetlands, State wildlife management areas, and State Scenic Rivers (i.e., Blind River) and developing compensatory mitigation plans commensurate with the level of planning conducted for flood risk reduction features, as mitigation is a project feature of the TSP.

Page 5-6, Section 5.4 Adaptive Management and Monitoring: The Corps has acknowledged that the Adaptive Management and Monitoring Plan (AM&MP) has yet to be developed. The FWS recommends enough money be included in the AM&MP to sufficiently address potential hydrologic issues as well as impacts to restoration projects if necessary. Development of that plan should be coordinated with the FWS and other natural resource agencies.

Page 6-1 and 6-2, Sections 6.5, 6.6, and 6.8 Endangered Species Act of 1973, Bald and Golden Eagle Protection Act of 1940, and Colonial Nesting Water Birds (respectively): If this project extends greater than 1 year, the FWS recommends continued coordination for potential impacts to threatened and endangered species, bald eagles, and migratory birds.

Page 6-2, Section 6.10 Fish and Wildlife Coordination Act of 1934: In this section, the Fish and Wildlife Coordination Act (FWCA) Report Recommendations are not included but rather are referred to in Appendix A. Please reference the Fish and Wildlife Coordination Act where it states the FWCA Report "....shall be made an integral part of any report.....submitted to the Congress or to any agency or person having the authority or the power...1) to authorize the construction of water-resource development projects..." The FWCA Report is often misunderstood to be a part of NEPA. However, NEPA is not a substitute for the FWCA but represents an expansion of the FWCA concept that fish and wildlife values are to be fully and equally considered and appropriately mitigated in water resource development planning. The FWS recommends that the Corps include and address the FWCA Report Recommendations in the Main Report.

Literature Sited

Department of the Army, U.S. Army Corps of Engineers Civil Works Program Five-Year Development Plan for Fiscal Year 2011 to Fiscal Year 2015, 145 pages. http://www.usace.army.mil/Portals/2/docs/civilworks/5yr_devplan/fy11_5yrplan.pdf

Krauss, K.W., Duberstein, J.A., Doyle, T.W., Conner, W.H., Day, R.H., Inabinette, L.W., and Whitbeck J.L., 2009. Site Condition, Structure, and Growth of Baldcypress Along Tidal/Non-Tidal Salinity Gradients. Wetlands, Vol. 29, No. 2, June 2009, pp. 505–519.

If you have any questions or comments on this letter, please contact Mr. David Walther (337-291-3122) or Ms. Catherine Breaux (504-862-2689) of our FWS Ecological Services Field Office, Lafayette, Louisiana.

Sincerely,

Stephen R. Spencer, Ph.D.
Regional Environmental Officer

Enclosure

cc: Coastal Protection and Restoration Authority
P.O. Box 44027
Baton Rouge, LA 70804-44027

St. Charles Parish Government
15045 River Road
P.O. Box 302
Hahnville, LA 70057

St. John the Baptist Parish Government
1801 West Airline Highway
Laplace, LA 70068

Pontchartrain Levee District
P.O. Box 426
Lutcher, LA 70071

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

October 9, 2012

Colonel Edward R. Fleming
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Fleming:

The Fish and Wildlife Service (Service) is submitting this Planning-aid Letter (PAL) based upon recent information provided by the U.S. Army Corps of Engineers' (Corps) Project Delivery Team (PDT) for the West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study (WSLP) in Ascension, St. Charles, St. James, and St. John the Baptist Parishes, Louisiana. The Service is aware that the Corps plans to choose a Tentatively Selected Plan (TSP) by the end of 2012, and we submit the following recommendations for consideration in that project development decision in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This PAL does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act.

The Corps is conducting a study to determine the feasibility of providing Federal hurricane protection to the western shore of Lake Pontchartrain. The study area is bounded by the Bonnet Carré Spillway to the east, the Mississippi River to the south, Lakes Pontchartrain and Maurepas to the north, and St. James Parish/Ascension Parish line to the west. The communities in this area include Laplace, Reserve, Gramercy, Lutcher, Garyville, Riverland Heights, and Carrollwood. The Louisiana Department of Wildlife and Fisheries manages the Maurepas Wildlife Management Area (WMA), which consists of a majority of the swampland within the project area.

According to an August 2012 map provided by the PDT, there are three preliminary levee alignments which have been identified through previous reconnaissance and feasibility studies that are being considered for the TSP (Figure 1). Generally, those alignments extend from the west guide levee of the Bonnet Carré Spillway to the vicinity of Hope Canal north of Garyville in St. John the Baptist Parish. Alignment A generally follows the wetland/non-wetland interface from LaPlace to Hope Canal. Alignment C generally follows en existing pipeline corridor north of Alignment A. Alignments A and C both tie into the Mississippi River levee. Alignment D generally follows the Interstate Highway 10 (I-10) corridor and extends outside the original project study area into Ascension Parish to tie into an existing non-federal levee.

For descriptions of fish and wildlife resource conditions, threatened and endangered species, other species of management concern, and existing management areas within the project study area, please reference the Service's January 9, 2009, letter (enclosed) in response to the Corps' Notice of Intent to prepare a Draft Environmental Impact Statement. Those descriptions and concerns have not changed since our 2009 letter. Please note that the Service will provide guidelines for in-water work in areas that potentially support the endangered West Indian manatee (*Trichechus manatus*) to avoid and minimize impacts to that species during project construction. Also, on September 11, 2009, the Service published two federal regulations establishing the authority to issue permits for non-purposeful bald eagle take (typically disturbance) and eagle nest take when recommendations of the National Bald Eagle Management Guidelines (http://www.fws.gov/southeast/es/baldeagle/NationalBaldEagleManagementGuidelines.pdf) cannot be achieved. Should you need further assistance interpreting the guidelines, avoidance measures, or performing an on-line project evaluation to determine whether application for a permit is necessary, please contact this office.

Depending on the alignment, construction of a flood protection levee has the potential to result in the direct loss and enclosure of valuable swamp and bottomland hardwood habitats. Developmental pressures on enclosed forested wetlands would likely increase with levee construction due to the reduced threat of flooding in the area. Reduced water exchange in the enclosed wetlands would lead to further water quality deterioration in the Lake Pontchartrain Basin by eliminating or reducing the filtering capacity of those wetlands. Wetland habitat losses would reduce populations of resident fish and wildlife, reduce important wintering habitat for waterfowl and other migratory birds, and reduce nursery habitat and detritus input important to the maintenance of estuarine-dependent fish and shellfish production.

The Service recommends implementation of Alignment A because it discourages wetland loss by enclosing the least amount of wetlands, involves the least amount of direct wetland impacts due to construction, and has the least impact to the Maurepas WMA (Table 1). If implementation of Alignment A is determined to be infeasible, then the Service would support Alignment C because it is the next least-damaging alternative to Alignment A (Table 1). The Service discourages selection of Alignment D because of the amount and quality of forested wetlands that would be enclosed, the amount of direct impacts to high quality forested wetlands that would be affected during construction, the alteration of the present hydrologic regime over a much larger area of high quality fish and wildlife habitat, the enclosure of the southern portion of the Maurepas WMA (Table 1, Figure 2), and the impacts to two proposed coastal restoration projects (i.e., the Convent to Blind River Diversion and the Hope Canal Freshwater Reintroduction).

The Service is aware that Alignments A and C do not provide protection to the entrance and exit ramps to I-10 at its intersections with United States Highway 61 (Hwy 61) and Louisiana State Highway 641 (Hwy 641), which undergo flooding during excessive rainfall events as well as during major storm events. Those alignments would also not provide flood protection to structures within St. James Parish, which are included within the study area and for which that Parish would like flood protection. In order to provide maximum consideration to the conservation of fish and wildlife habitats, as well as to address the goals of the proposed study, the Service recommends that the Corps consider installing localized ring levees at I-10 and its intersections with Hwy 61 and Hwy 641 to eliminate flooding and to maintain evacuation and emergency vehicle routes between

Baton Rouge and New Orleans. We also recommend extending Alignment C along either: (1a) the wetland/non-wetland interface up to Louisiana State Highway 3125 (Hwy 3125) west of Grand Point; or (1b) Hwy 61 to its intersection with I-10. The Service proposes Alignments C-1a and C-1b (Table 1, Figure 2), along with the localized ring levees, as possible alternatives to Alignment D. Those additional alternatives would allow for reducing and minimizing impacts to fish and wildlife resources while providing flood protection for structures within St. James Parish as well as the major highway intersections that allow ingress and egress to the affected areas and maintain evacuation and emergency routes between Baton Rouge and New Orleans. The Service is willing to work with the Corps on a finalized alternative alignment.

Table 1. Proposed alignments and the Service's recommended alignment revisions for consideration as alternatives to Alignment D.

ALIGNMENT	LENGTH*	ENCLOSED WETLANDS*	IMPACTS, ISSUES, and PROTECTION
Alignment A	19 miles	5 square miles	• Least damaging alternative • Encloses minimal amount of wetlands • Least impacts to Maurepas WMA • No impacts to Convent/Blind River Diversion • Impacts to Hope Canal Diversion need to be addressed • Provides protection for Montz, Laplace, Reserve, Garyville
Alignment C	19 miles	16 square miles	• Second least damaging alternative • Encloses additional wetlands • Small impacts to Maurepas WMA • No impacts to Convent/Blind River Diversion • Impacts to Hope Canal Diversion need to be addressed • Provides protection for Montz, Laplace, Reserve, Garyville
Alignment C-1a	29 miles	20.5 square miles	• Encloses additional wetlands • Few impacts to Maurepas WMA • No impacts to Convent/Blind River Diversion • Impacts to Hope Canal Diversion need to be addressed • Provides protection for Montz, Laplace, Reserve, Garyville, Gramercy, Lutcher, Grand Point
Alignment C-1b	28 miles	61 square miles	• Encloses extensive wetland areas • Impacts the southwestern portion of Maurepas WMA • Impacts to Hope Canal Diversion need to be addressed • Impacts to Convent/Blind River Diversion need to be addressed • Provides protection for Montz, Laplace, Reserve, Garyville, Gramercy, Lutcher, Grand Point, Convent, Romeville
Alignment D	27 miles	79 square miles	• Encloses greatest amount of wetlands • Impacts southern portion of Maurepas WMA • Impacts to Hope Canal Diversion need to be addressed • Impacts to Convent/Blind River Diversion need to be addressed • Provides protection for Montz, Laplace, Reserve, Garyville, Gramercy, Lutcher, Grand Point, Convent, Romeville

* Unrefined estimates using ArcMap® and Corps' estimates from their Feasibility Scoping Meeting information.

Regardless of which alignment the Corps chooses as the TSP, the Service recommends that (1) the integrity of present hydrologic regimes be maintained via installation of water control structures in the levee to ensure adequate water circulation, and (2) preservation of enclosed wetlands be ensured in perpetuity via the purchase of non-development easements and/or local flood zoning ordinances. Providing perpetual preservation of enclosed wetlands would also provide for flood storage areas within the levee system during excessive rainfall events. The Service also recommends that any pumping stations associated with the project should not discharge directly into canals or other open water bodies, but rather into wetland systems that can assimilate those nutrients being discharged.

The Corps has almost completed full implementation of the newly-authorized protection levels for hurricane and flood protection projects in the Greater New Orleans area. The combined need for borrow necessary to complete authorized flood protection improvements and construction of other proposed and implemented Federal and non-Federal hurricane and flood protection levees may have diminished local availability. The searches for levee-building material have been conducted on a project-by-project basis, and have led to the least-expensive and easiest sources for borrow material, which are usually located within wetlands and/or bottomland hardwoods adjacent to the proposed levee. Use of such on-site sources often has adverse impacts on wetlands and is frequently inconsistent with coastal restoration efforts. Use of those sites will be counterproductive with respect to minimizing wetland impacts and attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem. The Service's priority selection process for borrow material outlined in our August 7, 2006, letter to the Corps regarding the Greater New Orleans Hurricane and Storm Damage Risk Reduction project (enclosed) should be utilized. In addition, the Service provided, via a September 9, 2008, letter, a map (enclosed) identifying potential borrow areas that are likely to have minimal impacts to fish and wildlife resources. Areas identified on that map should be investigated first as potential borrow sources. The Service will provide an updated map that is more specific to the subject study area.

We appreciate the Corps' consideration of our recommendations for further development of a TSP for the proposed project. Should you or your staff have any questions, or if you would like to meet with us regarding the content of this letter, please contact Ms. Brigette Firmin (337/291-3108) of this office.

Sincerely,

Jeffrey D. Weller
Supervisor
Louisiana Ecological Services Office

Enclosures

cc: EPA, Dallas, TX
LDWF, Baton Rouge, LA
CPRA, Baton Rouge, LA
LDNR, Coastal Management Division, Baton Rouge, LA

Figure 1. Currently proposed alignments for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study.

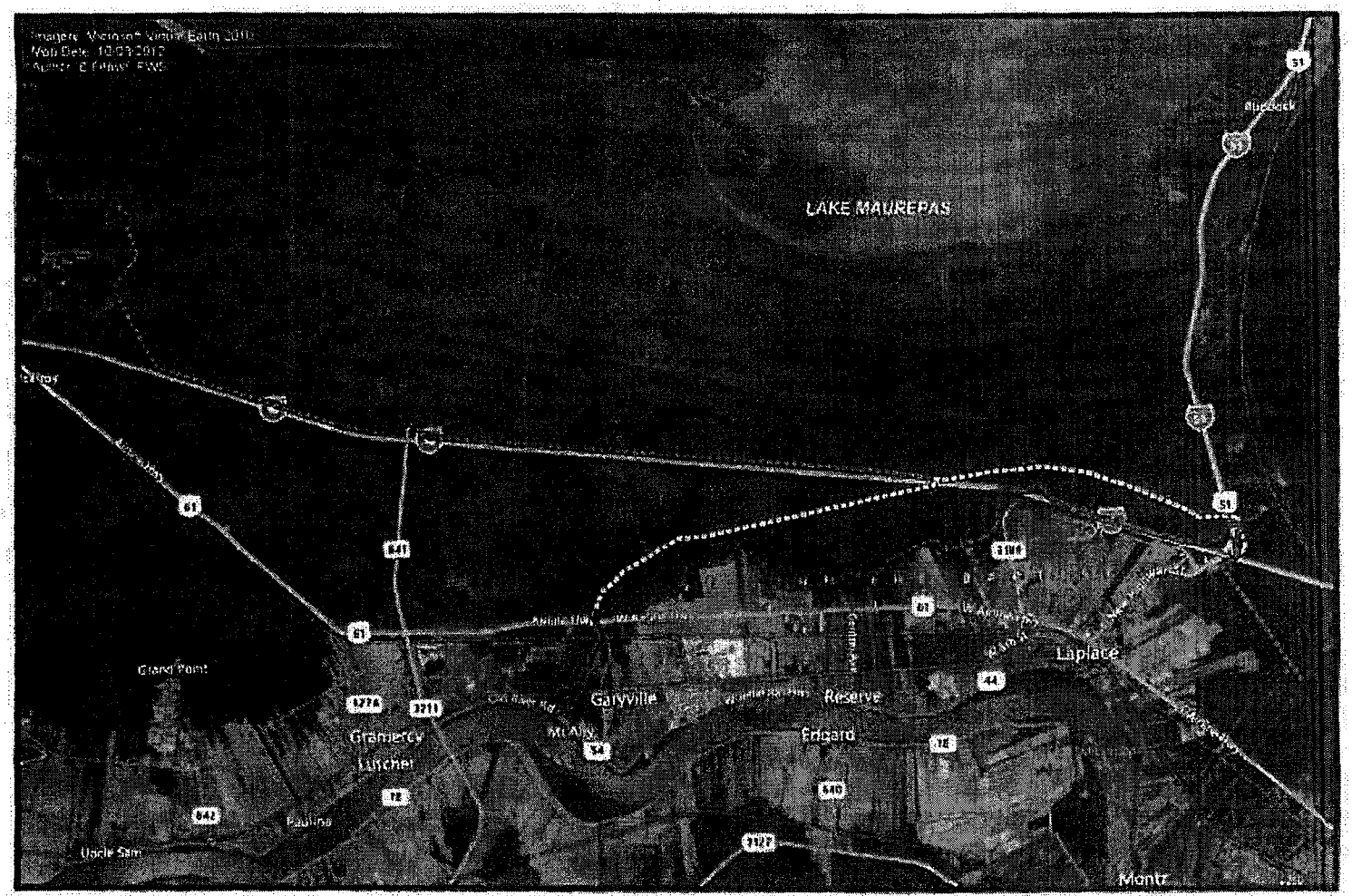
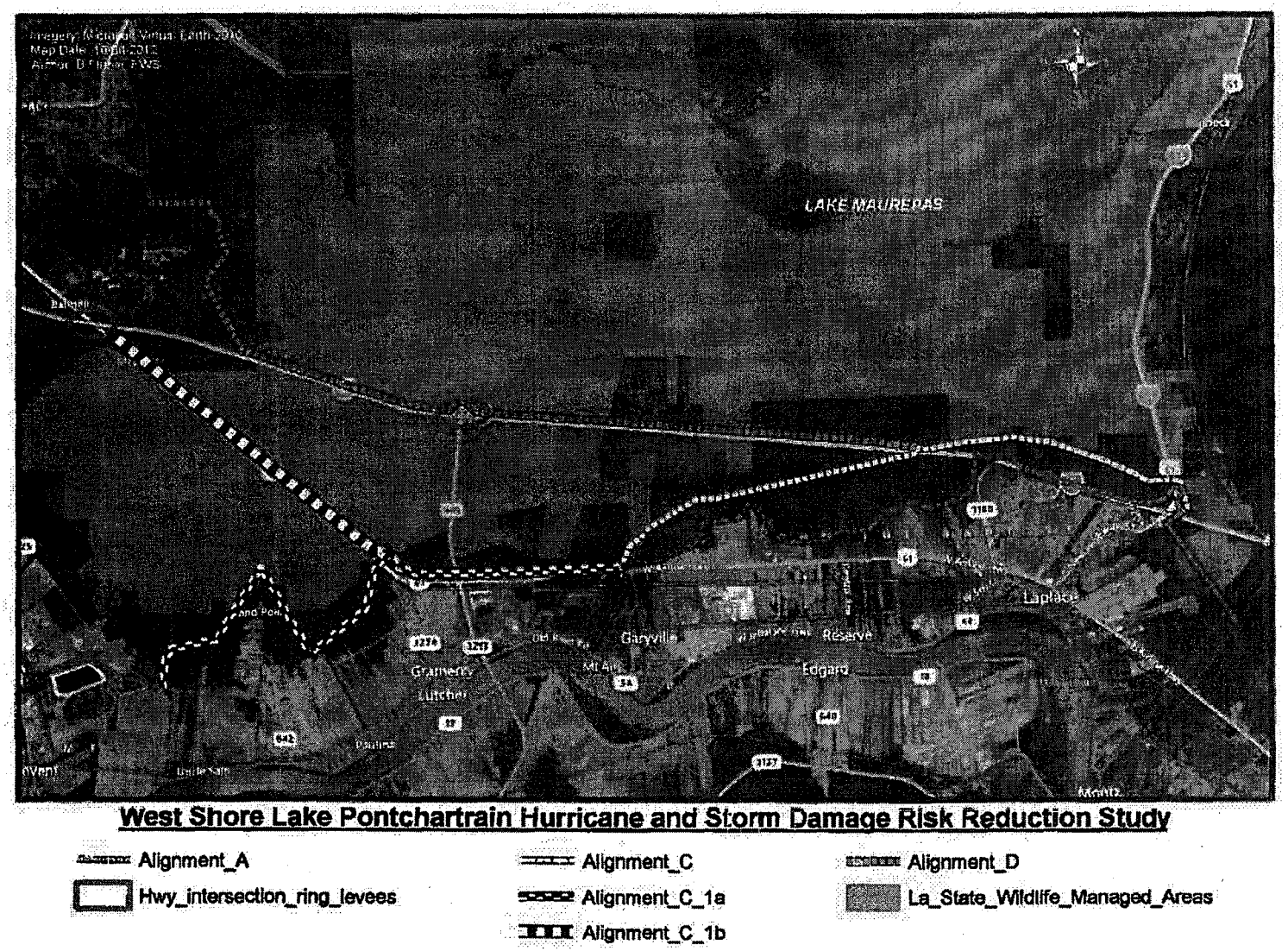


Figure 2. Proposed revised alignments for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study.



GULF RESTORATION NETWORK
healthygulf.org

UNITED FOR A HEALTHY GULF

541 Julia Street, Suite 300, New Orleans, LA 70130
Phone: 504.525.1528 Fax: 504.525.0833

8 October, 2013

Dr. William P. Klein, Jr
United States Army
Corps of Engineers
New Orleans District
Post Office Box 60267
William.p.klein.jr@usace.army.mil

RE: West Shore Lake Pontchartrain DEIS and Draft Feasibility Study

Dr. Klein,

I am writing on behalf of the Gulf Restoration Network (GRN), a diverse coalition of individual citizens and local, regional, and national organizations committed to uniting and empowering people to protect and restore the resources of the Gulf of Mexico.

I am writing briefly to support a Lines of Defense alignment for St John and St James Parish, and against any alignments that impound undue acreages of wetlands, such as Alignment D.

We are happy to see the array of alternatives include the original Lines of Defense proposal, Alignment A, which we feel is most appropriate.

We feel Alignment A is most appropriate because of the low impact to wetlands, because it avoids the problem of "induced risk," and because we have seen that parishes and local landowners will often construct additional protective levees at the limits to development anyhow—for example in Terrebonne Parish. Given the limited amount of borrow, it seems wise to only build the levees once, as well as limit the impact to protective cypress forests.

We question the completeness of a document that does not outline the borrow sources for this levee system. Of course, we are opposed to borrow from wetland and water areas, as is proposed in Terrebonne. We hope that borrow material will come from the river, as was the case for the I-10 construction.

We question the completeness of a study about floodwaters that does not include hydrological modeling of surge waters, the potential for flooding from rain, and other parameters typically associated with storm risk reduction projects. We saw that the Corps could quickly evaluate the potential for the GNO HSDRRS to have induced surge after Isaac, we know it can be done.

GULF RESTORATION NETWORK
healthygulf.org

UNITED FOR A HEALTHY GULF

541 Julia Street, Suite 300, New Orleans, LA 70130
Phone: 504.525.1528 Fax: 504.525.0833

Given the limited amount of sand in the River, though, we are concerned that outward levee alignments, along I-10 or highway 61, will consume undue amounts of sand in their more rapid subsidence. Such alignments would seem to take longer to construct.

We have seen that the Morganza to the Gulf levee will not be performing to the minimum risk reduction standard for federal insurance until 2035, due to the need to wait for the levee to settle into the soft sediments of the area. We feel that time is of the essence, and that ring levee alignments can protect human life more quickly.

Given the immense amount of Cypress forests acreage impacted by D, it is seriously questionable whether mitigation for such damage is remotely possible for that alignment, given the unique ecological qualities as well as storm surge protection values embodied in those forests of the Pontchartrain Basin.

The Corps should evaluate the risk reduction qualities of the cypress forests that are to be impacted, and produce a study of the actual storm likelihoods for the different alignments if the forests are included—for example, although the levee system is designed for "100-yr" or 1% protection, the Corps inclusion of the value of protective cypress forests could increase a given levee beyond this percentage.

As the Corps must consider cumulative impacts, we oppose construction of levees on existing impoundments of I-10 or highway 61. Just because flows to this area are hampered does not justify further damaging the system. In fact, we are of the hope that the pair of planned River Restoration projects can add enough sediment and organic accretion that a portion of the Cypress forests can become viable again.

The impoundment and pumping of Cypress forests causes increases in drainage expenses over time, and these expenses are not included in the document. New Orleans' levee system cost over 14 billion dollars, and, while functional, the drainage system is of a flawed design for our subsiding region. There is an ongoing effort to re-design the GNO drainage system at the cost of $6 billion.

We feel that the maintenance costs of these levees, including the induced subsidence and spiraling costs of drainage, are not adequately reflected in the document, and would lower cost-benefit ratios of alignments that impound undue amount of wetlands.

We are concerned about impacts to the Blind River, an Outstanding Natural Resource Water, unique on the planet earth, as well as the Maurepas Swamp WMA.

GULF RESTORATION NETWORK
healthygulf.org

UNITED FOR A HEALTHY GULF

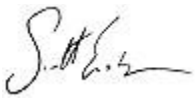
541 Julia Street, Suite 300, New Orleans, LA 70130
Phone: 504.525.1528 Fax: 504.525.0833

The Corps must consider the induced surge that outward alignments, such as D, would have on towns like Springfield.

I reserve the right to rely on other comments submitted for this project.

Thanks for the opportunity to comment, and please send our office notice of any updates or changes to this project.

For a healthy Gulf,
[sent via e-mail]



Scott Eustis, M.S., Coastal Wetland Specialist

Cc: Matt Rota, MEERM, Policy Director
Geri Davis, Tulane Environmental Law Clinic
John Ettinger, U.S. EPA, Region 6
Dr. John Lopez, Ph.D

Louisiana Audubon Council
1522 Lowerline St., New Orleans, Louisiana 70118-4010

October 10, 2013

U.S. Army Corps of Engineers,
CEMVN-PDN-CEP
Attention: Dr. William P. Klein
New Orleans District,
P.O. Box 60267,
New Orleans, LA 70160-0267.

Re: West Shore Lake Pontchartrain La, Hurricane and Storm Damage Risk Reduction Study; (DWSLPS), and Integrated Draft Feasibility Report and "Environmental Impact Statement" (DIFR & DEIS).

Dear Dr. Klein,

The Louisiana Audubon Council has reviewed the DWSLPS and DIFR/DEIS. We support Alignment "A" with reservations. Based on our analysis of the documents, we have concluded that the draft report does not constitute a DEIS because of omissions which are discussed below. We request that the Corps' "final report" be designated the Draft EIS and circulated to the public for review along with the required NEPA agency documents.

While we support flood protection for developed areas, we oppose alignments which will enclose significant areas of wetlands. Alignment "A" follows the wetland/non-wetland interface and encloses the least wetlands while providing protection for the developed area.

Forested wetlands should be kept outside a levee to provide surge protection for the levee system. Many studies have shown that wetlands will significantly dampen the storm surges and thus provide natural protection for levees. Studies, after Katrina, showed that the levees which had wetlands on the non-protected side suffered less damage than those that didn't.

Levees built across forested or non-forested wetlands also have long-term maintenance problems, require many more lifts and, therefore, increased long-term costs. Wetlands that are enclosed will undergo hydrologic changes which will reduce their productivity.

The mitigation estimates in the draft study range from $132 million to $1.7 billion (range for Alternative "A" through "D", in Table K-1). The mitigation for Alternative "A" has the lowest cost and encloses 5 sq. miles of wetlands. Alternative "C", the Tentatively Selected Plan (TSP), will enclose 16 sq. miles of wetlands. (USACE, 2013a).

Inadequacy of the "DIFR & DEIS":

Of concern to the Audubon Council, is the inadequacy of the Draft Feasibility Report and "DEIS". This document does not constitute a Draft EIS because of the many omissions in the Report: 1) EPA has not submitted a CWA letter; 2) USF&WS report is not complete because the Service does not have adequate information from the Corps in which to respond (letter dated 6/5/13). These agencies are waiting for the Corps' "final report" so they can submit their required NEPA documents along with those of NMFS and LDWF.

The USF&WS letter of June 5th to Col. Hansen, states: "This [FWS] document does not constitute the report of the Secretary of the Interior as required by Section 2 (b) of that Act (48 Stat. 401,

as amended; 16 USC 661 et seq.). The Service is coordinating with National Marine Fisheries (NMFS) and the Louisiana Department of Wildlife and Fisheries (LDWF); their comments will be incorporated into the final report." (Appendix A, Annex G).

The Service also stated, "Given that design and evaluation of most project features has been at the programmatic level, the Service cannot fulfill its Coordination Act responsibilities at this time." (USFWS, 2013b, p. 16).

The Corps has also acknowledged the omissions with a note at the bottom of several sections which have been left blank: "these documents, associated analyses and coordination will be completed during the feasibility-level analysis phase of this study which would occur following release of the Draft Environmental Impact Statement, and would be included in the Final Environmental Impact Statement." (USACE 2013a, Appendix A, Annex A-B).

The following are sections which the Corps states are required by NEPA process but are not included in the Draft Report.

Environmental Laws & Compliance (*NEPA Required) - in Chapter 6, DIFR

6.2 Clean Water Act of 1972 – Section 401 (Water Quality) -- Compliance will be documented in a final report.
6.3 Clean Water Act of 1972 – Section 404(b)(1) (Wetlands) -- Compliance will be documented in a final report.
6.4 Coastal Zone Management Act of 1972 (Coastal Zone Development) -- Compliance will be documented in a final report.
6.10 Fish and Wildlife Coordination Act of 1934 (Fish & Wildlife) - Incomplete, Compliance will be documented in a final report which will include NMFS and LDW&F (USF&WS letter dated 6/5/13, Appendix, Annex G).
6.11 Magnuson-Stevens Fishery Conservation and Management Act of 1976 and The Magnuson-Stevens Act Reauthorization of 2006 (Essential Fish Habitat). Incomplete
6.14 National Historic Preservation Act of 1966 (Cultural and Historic Resources). Some sites unevaluated. "CEMVN has not yet presented a formal conclusion for cultural resources . . . "

The environmental review process is piecemeal and the cumulative affects are not adequately addressed in the draft report, as required by NEPA. This appears to be as a result of the new S.M.A.R.T. planning policy which de-emphasizes environment impacts of Corps' projects and accelerates the approval process. The NEPA requirements are just inserted into a draft feasibility report to be passed off as a draft EIS. (see USACE, 2013c).

We, therefore, agree with various federal agencies that the report is deficient and we do not consider this document a draft EIS. The NEPA process should be restarted when the Corps' "final report" is complete. This "final report" should be submitted to the agencies and the public as a Draft EIS for review and comment. A proper public review will not be achieved until there is an opportunity to read the final comments of NEPA-required agency responses. Will the public have another opportunity to comment on the content of the final report? Or, will it be sent to the Chief of Engineers for approval without further public input?

Inadequacy of Hydrology Study:

The Corps has stated that the number of gates for TSP or other alternatives have not been determined. "Hydrologic information is limited, so estimates were not developed to evaluate the number of environmental structures that would be required for the alternatives." (Draft Rept., p. 3-13).

How can an environmental evaluation be made if one of the most significant environmental issues of the project (the number and operation of environmental structures), have not been determined? The structures are necessary to preserve the environmental integrity of the enclosed wetlands. There should be a comparison for all alternatives.

The preliminary hydrologic modeling did not include rainfall. (Draft Rept., p. 4-1 & 4-11).

Relative Sea level Rise and "Leaky Levees".

According to the Figure 2-2, the relative sea level rise (RSLR) in the project area will rise over 3.2 ft by the year 2070. This is an average (intermediate) rise with the highest projection being 4 ft in 2070. [Note: the data listed in Table 2.2 for low and intermediate RSLR do not match the curves in Fig. 2.2 for the year 2070.]

We question the Corps statement that gates will be closed only 8.5 days per year for the TSP. With the addition of RSLR how many days will they be closed based on the 3.2 ft rise of RSL?

This is a similar issue that we addressed in the Morganza to the Gulf Project where the Corps admitted that the water control structures would have to be closed because of RSLR.

"Under future conditions, closure frequency could increase if the closure trigger is not adjusted to account for sea level rise. For example, under existing conditions, HNC floodgate closure (based on a 2.5-ft closure stage only, not the salinity triggers) would occur approximately 1.5 days per year. If the trigger remained the same through 2085, low RSLR would require closure 5 days per year by 2035 and 168 days per year by 2085 (refer to RSLR rates in table 3-1). Intermediate RSLR would require closure for 15 days per year by 2035 and 354 days per year by 2085. High RSLR would require closure for 24 days per year in 2035 and 365 days per year in 2085. To prevent frequent structure closings, operation plans will need to be re-evaluated periodically and closure trigger elevations may need to be increased if significant sea level rise occurs." USACE (2013b, p. 81).

The Corps has not addressed this issue in the Draft Report. Why not? The full impacts of RSLR have not been integrated into the plan nor has the hydrology and impacts of the levees and impoundments of the wetlands been evaluated for all the alternatives.

The report mentions (p. 4-17) that the closure of the gates and culverts in preparation for a storm surge could have significant impact on the American eel because it is dependent on fresh and salt water for its life cycle. The alternatives which would increase the impoundments of wetlands would also increase the adverse impact on this species. American eels are highly sought after for the Asian market and provide an economic resource for commercial fishers.

"If operating plan changes close the levee system more often due to RSLR then those impacts would have to be analyzed and documented in future supplemental NEPA document" (p. 4-18). The hydrologic modeling can be done now to predict future impacts for each alternative. Why wait? Study the impacts of increased closures based on the predicted RSLR. This was done for the Morganza to Gulf project as noted above.

"It is unknown at this stage of the study process how water levels within the enclosed system would respond with regard to increase in RSLR. The magnitude of the potential for substantial additional indirect impacts to enclosed forested wetlands, swamp and EFH is also unknown." (Draft Rept., p. 4-19).

Incomplete Benefit/Cost analysis:

"At this stage mitigation costs for indirect impacts remain uncertain due to limited hydrologic information and lack of a full wetland assessment." (Draft Rept., p. 3-10).

According to the footnote for Table 5-2, "Monitoring and Adaptive Management costs are not included. " [in the cost apportionment for the TSP].

"A full economic analysis will be conducted during the feasibility level design and documented in the "final report". (Draft Rept., p. 5-4).

Did the environmental costs of the various alignments include the mitigation and impacts to fisheries (American eel, etc.?). Degradation of the enclosed wetlands over time should be included as a cost. Also, impacts to important fishery species should be considered.

All these issues (reviewed in above section) highlight the need to minimize the acreage enclosed by the levee project. Therefore, Alternative "A" would have the least adverse impact on the environment. All the environmental impacts should be quantified and included as costs in calculating the B/C ratio for each alignment.

Incomplete Report on Borrow locations:

"Borrow material would come from the Bonne Carre' Spillway or alternative borrow sources not yet identified." (Appendix B, p. 6). The draft report states that a canal will be dug along the new levee. Will the material dredged from the canal be used as borrow for the levee system?

Will the borrow meet the post-Katrina soil standards used for federal levees? If so, this should be clearly stated in the final report.

Maintaining integrity of Levee system:

We strongly support the incorporation of the post-Katrina engineering design criteria, especially the new soil standards, into the federal levees. The failure of many New Orleans levees was a result of poor soils incorporated into the federal levee system. With one weak link in the system, there could be a catastrophic failure. There is no reference in the "draft report" to the Post-Katrina soil standards which were adopted by the Corps for the New Orleans levee rebuilding. Therefore, we request that this soil standard be referenced in the "final report".

How many years will it take to build the levee system to base-year elevation once it is authorized and funded? How many lifts will it take to reach the authorized project elevation? This timeline should be included in the "final report".

We are equally concerned by closure of the environmental structures and the impacts this will have on the fisheries resources. This would not be a such a problem if fewer wetlands were included within the levee system as recommended discussed for Alternative "A". A levee built along the wetland/ non-wetland interface should have less long-term maintenance problems.

Mitigation:

"A mitigation plan for the TSP will be completed following the feasibility level design and analysis and will be included in the "final report"." (p. 5-6). The F&WS recommends that, "mitigation measures should be constructed concurrently with the flood damage reduction features." (USF&WS, 2013b, p. 14). We agree. They also recommend a conservation easement to protect and prevent the development of wetlands enclosed by the levee. (p. 13).

"At this stage of the study, we have yet to conduct a traditional habitat impact analysis using the Wetland Value Assessment (WVA) methodology." (Draft Rept., p. 4-13).

The mitigation estimates in the draft study range from $132 million to $1.7 billion (range for Alternative "A" through "D", in Table K-1). Alternative "A" will have the lowest cost since it encloses the least wetlands.

Summary:

We support Alignment "A" which would have less impact on the Maurepas Swamp WMA and the River Reintroduction into Maurepas Swamp (PO-29). It appears that the TSP (Alternative "C") is the selected plan. In our opinion, the draft report is biased toward this alternative over Alternative "A".

To provide flood protection for other up-river communities, we recommend that the Corps consider separate ring levees built on the wetland/non-wetland interface. This would be less expensive and cause much less environmental damage while providing flood protection.

Because of the inadequacy of the draft report, the NEPA process should be restarted when the Corps' "final report" is complete. This "final report" should be re-submitted as a Draft EIS to the agencies and the public for review and comment. This will allow a proper, comprehensive evaluation of the Corps TSP and other levee alignments.

Sincerely,

Barry Kohl, Ph.D.
Geologist, and President of
the La Audubon Council

cc:
Sierra Club, Delta Chapter

Gulf Restoration Network (GRN)
Atchafalaya Basin Keeper (ABK)
Louisiana Environmental Action Network (LEAN)
John Lopez, Lake Pontchartrain Basin Foundation
USF&WS, Lafayette
NMFS, Baton Rouge
National Audubon Society, Baton Rouge
EPA, Region 6, Dallas
LDW&F
La DNR
Mark Davis, Water Institute, Tulane Univ.
Oliver Houck, Tulane Univ.

References:

Kohl, B., 2013. LAC letter to Nathan Dyan re: Draft RPEIS for Morganza-to-Gulf, dated Feb. 18, 2013.

USACE 2013a. West Shore Lake Pontchartrain La, Hurricane and Storm Damage Risk Reduction Study; (DWSLPS), and Integrated Draft Feasibility Report and "Environmental Impact Statement" (DIFR & DEIS). Dated August 2013, NOD Corps.
URL: http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.aspx

USACE 2013b. Draft Post Authorization Change (DPAC) Report Morganza to the Gulf of Mexico, Louisiana, January 2013. Included in CD distributed by NOD as MtG Item 02a., 114 pp.

USACE, 2013c. Environmental Evaluation and Compliance in SMART Planning Feasibility Studies. PowerPoint presentation on Aug 15, 2013 by E. Haberer and J. Furry, USACE Headquarters.
URL: http://planning.usace.army.mil/toolbox/smart.cfm

USF&WS, 2013a. Letter to Col Richard Hansen from Jeff Weller, Supervisor Louisiana Ecological Services Office, F&WS, Lafayette. Letter dated June 5, 2013.

USF&WS, 2013b. Draft Fish and Wildlife Coordination Act Report for WSLP Louisiana HSDRR Feasibility Study. Appendix A, Annex A, Corps DWSLPS and DIFR/DEIS, dated August 2013.

October 25, 2013

U.S. Army Corps of Engineers, CEMVN-PDN-CEP
Attention: Dr. William P. Klein
P.O. Box 60267
New Orleans, LA 70160-0267

Re: ***West Shore Lake Pontchartrain La., Hurricane and Storm Damage Risk Reduction Study; and Integrated Draft Feasibility Report and "Environmental Impact Statement"***

Dear Dr. Klein,

Providing storm risk reduction for vulnerable communities is vital for coastal Louisiana, and it is long overdue for east bank river parishes. Unfortunately, we do not believe that this Feasibility Report and Environmental Impact Statement adequately analyzes the alternatives chosen to reach that goal, nor does it provide a compelling reason to accept the proffered Tentatively Selected Plan.

It is essential to find robust, affordable and sustainable combinations of structural, non-structural and restoration strategies to determine a practical solution for storm risk reduction in this area. These strategies should work in concert with each other, as envisioned by Congress when it commissioned the Louisiana Coastal Protection and Restoration (LACPR) effort, and by the state of Louisiana when it adopted the 2012 *Comprehensive Master Plan for a Sustainable Coast*. We fully support finding a solution that is most compatible with the equally pressing need to restore the swamp forests that are integral to sustaining risk reduction measures and thereby the continued economic and cultural viability of river parish communities.

Corps of Engineers Civil Works projects should be well conceived and designed, should avoid, minimize or fully mitigate environmental impact, and should be based upon a thorough, defensible and transparent analysis. This ensures that both the federal and non-federal sponsors get the best value.

It was therefore with a sense of anticipation that we awaited the first Feasibility Report and Environmental Impact Statement to be prepared by the New Orleans District under the new SMART Planning Process, or 3x3x3 procedures, recently adopted by the Corps Civil Works program. It was our understanding that 3x3x3 was meant to streamline processes that had become encumbered by unnecessary steps and superficial overlays that contributed little to

substantive analysis and timely decision making. Our understanding was that 3x3x3 was intended to advance those most deserving civil works projects that rise to the top of a fiercely competitive national agenda. We did not understand 3x3x3 to mean simply not doing the necessary analysis, as a means to just do *less*. In practice however, this first attempt seems to have been just that—not *more with less*, just *less*.

In our opinion, residents of the river parishes are being provided a disservice by presuming that the level of analysis presented in this Report and Statement positions this project to realistically compete for the attention of a limited federal purse.

In Louisiana, we have abundant experience with projects that have been encumbered by decades of delay because the original analysis was inadequate and the cost estimates were too low, requiring re-authorization by Congress before we could even begin to compete for appropriations. Without adequate analysis, project proposals have no realistic chance of ever being built, consequently doing more harm than good to citizens that look to these projects for practicable solutions to very real risks to their lives and livelihoods. In this case insufficient analysis exists from which to draw a conclusion regarding the proposed alternatives.

We fail to understand why, for instance, there is no hydrological solution to the question of how many gates will be needed in Alternatives C and D to take care of tidal interchange, run-off, projected river diversions, and a range of projected future subsidence and sea level rise scenarios. Without that information, there can be no substantive cost comparison or measure of ecological effects. Nor can one make a judgment about whether these so-called "leaky levees" will still be operational in 50 years given relative sea level rise.

With such uncertainties, we question how any alternative could be chosen. However, if an alternative had to be chosen, then Alternative A might seem the most defensible conclusion, given its minimal impacts.

Alternative C *seems* to be a reasonable alternative to Alternative A in terms of cost and logistics. We applaud the decision to embrace non-structural solutions in a portion of the study area in Alternatives A and C. It would be helpful to have a more detailed discussion of why a continuation of an Alternative A or C type alignment into St. James and Ascension parishes was rejected for further study, inasmuch as it would be the obvious structural alternative to the highly problematic Alternative D.

More analysis is needed before the Corps proceeds with any of the Alternatives. Some questions that require resolution are:

- What are the true initial costs of the alignments, based upon adequate geotechnical analysis, and of future lifts?

- How will the alternatives perform against a reasonable range of RSLR scenarios over the life of the project and beyond?
- How will they interact with diversions at Blind River and Hope Canal?
- What will be the locations, sizes, initial costs and ongoing operation and maintenance costs, which must be assumed by the local sponsor, of the necessary hydrological structures?
- How will wetlands enclosed by Alternatives C and D be protected from induced development?
- Will the project, especially Alignment D, induce surge in nearby communities like French Settlement, Killian, Ponchatoula and Manchac, and indeed in lakeside St. Tammany communities?
- Where will the needed borrow be obtained and how will the environmental effects of borrow removal be mitigated?
- How and where will the project imprint and project indirect effects be mitigated? We note with alarm that six years after construction began, no mitigation has taken place for the HSDRRS footprint. We suggest that one way to avoid that outcome is to design this project in conjunction with a mitigating project from the 2012 Louisiana's *Comprehensive Master Plan for a Sustainable Coast* or the *Louisiana Coastal Area* plan. We also suggest that such mitigation be undertaken not based upon traditional analysis, which fails to get at underlying systemic problems, but rather in a way that changes the trajectory of system function within the Maurepas basin.

At the present time, we cannot support any of the proposed alternatives. We understand, however, the urgency of the risk reduction need for these communities. We urge the Corps to move expeditiously towards a Chief's Report, but to forestall a final choice among the Alternatives until the analysis is complete. Thank you for the opportunity to comment.

Sincerely,

Steve Cochran, Director
Mississippi River Delta Restoration Program
Environmental Defense Fund

David Muth, Director
Mississippi River Delta Restoration Program
National Wildlife Federation

Doug Meffert, Vice-President/Ex. Director
National Audubon Society/Louisiana Office

Rebecca Triche, Executive Director
Louisiana Wildlife Federation

Steven Peyronnin, Executive Director
Coalition to Restore Coastal Louisiana

LPBF
SAVE OUR LAKE
SAVE OUR COAST
LAKE PONTCHARTRAIN BASIN FOUNDATION

DATE: October 24, 2013

TO: U.S. Army Corps of Engineers, CEMVN-PDN-CEP
Attention: Dr. William P. Klein
P.O. Box 60267
New Orleans, LA 70160-0267

Re: West Shore Lake Pontchartrain La., Hurricane and Storm Damage Risk Reduction Study; and Integrated Draft Feasibility Report and "Environmental Impact Statement"

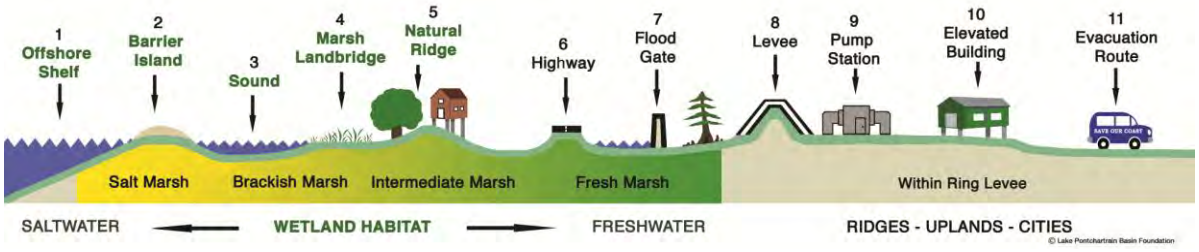
Dear Dr. Klein,

Since the horrific events of Hurricane Katrina, LPBF has researched, monitored, evaluated and advocated for a Multiple Lines of Defense strategy for coastal Louisiana. This approach was explicitly adopted in the Corps' LACPR study, and the 2007 Louisiana State Master Plan. The 2012 State master plan fully embraces the concept that coastal habitats are absolutely vital to flood protection and recommends half of the $50 B dollar budget be spent on coastal restoration to complement traditional flood protection.

Several studies, including Corps documentation, demonstrate that cypress forests are the most effective wetland habitat to reduce storm surge. This characteristic is due to the obvious nature of a cypress forest with the height, strength and girth of the wetland trees. None of the levees in Louisiana are designed to function in the direct face of normal fair weather Gulf waters, much less the direct attack of the Gulf of Mexico during a hurricane. Levees in Louisiana must benefit from the buffering effect of wetlands. On the cover of LPBF's 2008 Multiple Lines of Defense report, we included this insightful quote below which we received from a reviewer in the dire aftermath of the devastating collapse of our flood protection system facing an extreme storm event.

"It may be hubris to think we could ever engineer our way out of this fix, when nature seems so aligned against us. It is certainly hubris to think we could do it without taking nature's assistance when it is offered."

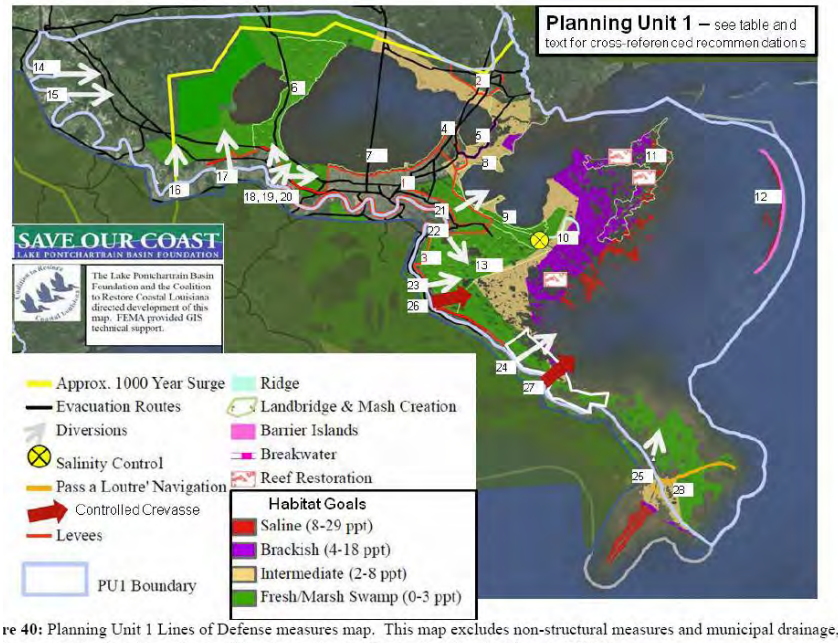
Quote from comments on the MLODS draft report by David Yeargin



It is worth reconsidering this quote for the West Shore Lake Pontchartrain Draft Feasibility Report and EIS, since, in this study area, nature is actually aligned with us to provide flood protection. Yes, it seems there may be a win-win solution.

LPBF has supported local levees to protect both north and south shore communities. The Slidell levee, St. Charles and the St. John Levees were explicitly recommended in the Comprehensive Recommendations Supporting the Use of the Multiple Lines of Defense Strategy to Sustain Coastal Louisiana 2008 Report. LPBF also supported these levees successfully on the Framework Development team for the State Master Plan. These levee alignments have a consistent and beneficial approach to flood risk reduction:

- Building near the upland interface where soils are better, thereby reducing initial costs and maintenance costs for future lifts
- Keeping as much wetlands as possible on the flood side to maintain surge storage and to maximize the surge reduction benefit of the wetlands, reducing levee height requirements and reducing risk of levee failures.
- Avoiding unnecessary impacts to wetlands which, in a regional sense, reduce surge entering the coast.



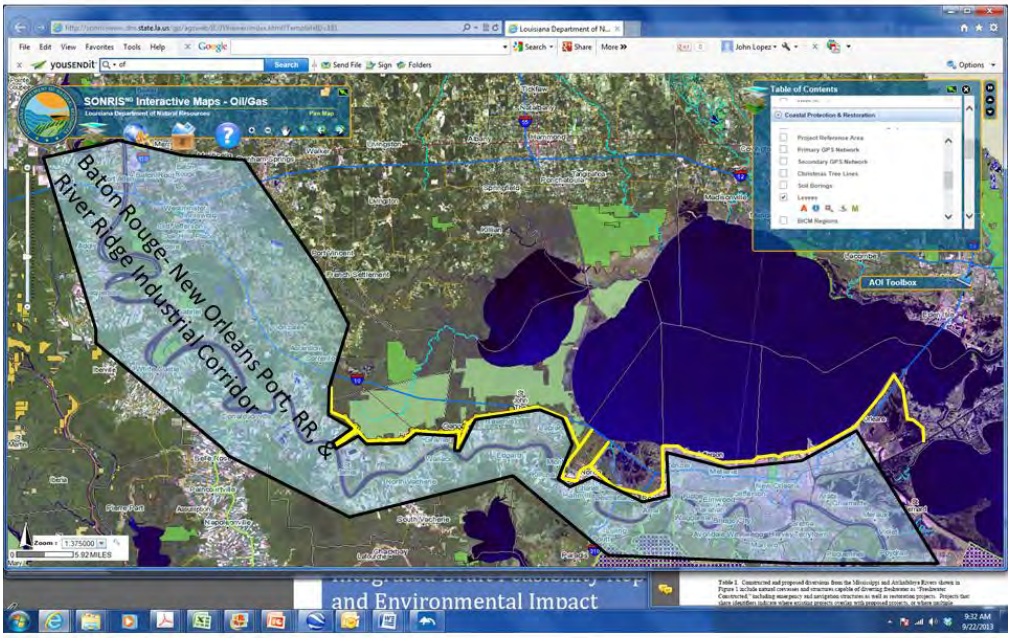
re 40: Planning Unit 1 Lines of Defense measures map. This map excludes non-structural measures and municipal drainage, h are considered an integral part of the Comprehensive Protection Plan for Planning Unit 1.

LPBF's recommendations included levees located near the upland interface including the Slidell levee and the St. John levee

For these reasons, we support the **levee component** of the C alignment in the Tentatively Selected Plan, but have concerns regarding the protection of St. James Parish which is part of the enormously valuable economic corridor extending from Baton Rouge to New Orleans. The corridor has had major recent industrial expansion, recently announced new expansions, and it is predicted that there will be enormously greater expansion in the next decade. This is because of the usual industrial fundamentals of access to cheap energy (natural gas), shipping (river and railroad), and freshwater (ground and marine). These are the fundamental assets of this corridor that drive a regional economy. St. James Parish is a small community but located within the nexus of this economic engine. Hurricane Isaac demonstrated that the River Parishes are at risk.
http://www.businessreport.com/1222013/Are_we_ready

A non-structural solution may not be adequate for the developed area of St. James Parish. Not surprisingly, the D alignment has drawn attention from the public, because it is the only levee that is within the West Shore Levee Report that would protect St. James Parish. A St. James Parish levee deserves consideration for the developed area of St. James Parish, but the D alignment has many

significant problems, and so an alternative levee alignment should be further evaluated. Most significantly, the D alignment levee will induce flooding locally and more regionally as far away as Slidell. The D alignment would enclose 79 square miles of surge storage in the form of cypress swamp. The D alignment encloses a swamp area that is the equivalent storage of 12% of Lake Pontchartrain. If there was any proposal to fill the equivalent of 12% of Lake Pontchartrain, there would be enormous outcry due to the potential effect on flooding. The swamps that would be enclosed are part of the regional storage of Lake Pontchartrain and its adjacent wetlands. However, this is just one of two major flood threats in the D alignment. The D alignment also jeopardizes the State Master Plan's Blind River Diversion proposal, which would help sustain the Maurepas Swamp, including the Maurepas Land Bridge. This diversion would help maintain and restore the cypress buffer outside of any of the proposed levees. Of course, there is also the potential damage and cost to the enclosed 79 square miles of cypress swamp. This alone may drive costs so high that the D alignment project may not be achievable.



The economic corridor from Baton Rouge to New Orleans is on the natural levee which should be considered for regional flood protection such as the possible levee alignment in yellow

The cypress swamps such as on the Maurepas Land Bridge are enormously significant in reducing surge to the Lake Maurepas rim, including bedroom communities near Baton Rouge. The Maurepas Land Bridge was identified by the Corps' LACPR report as a "Critical Landscape Feature" because of it propensity to reduce surge as evidenced by hundreds of ADCIRC models run after Hurricane Katrina. Over time with sea level rise, the greater Baton Rouge area will be threatened increasingly by surge. The D alignment would increase surge induced flooding westward toward communities of Port Vincent, Maurepas, and even further west into Ascension Parish by decreasing storage, deflecting surge and possibly accelerating the loss of the land bridge. In contrast, a levee alignment near the upland interface provides levee protection for St. James, while maintaining surge storage and accommodating for the diversion which assist further with surge protection.

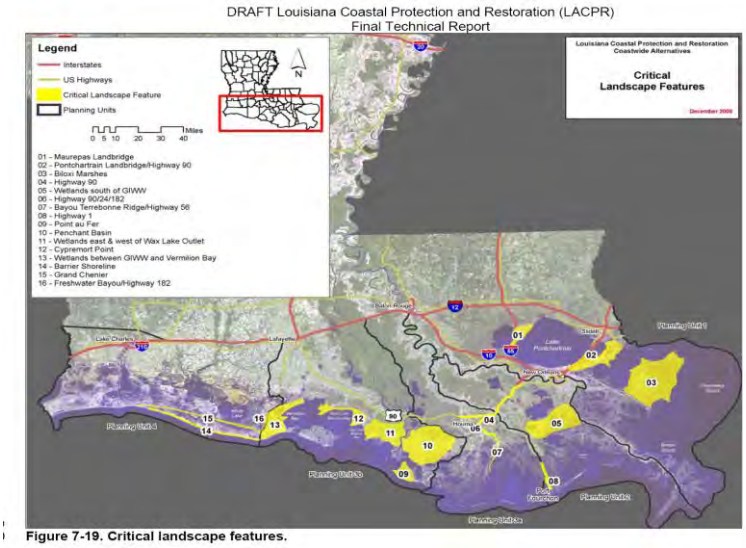
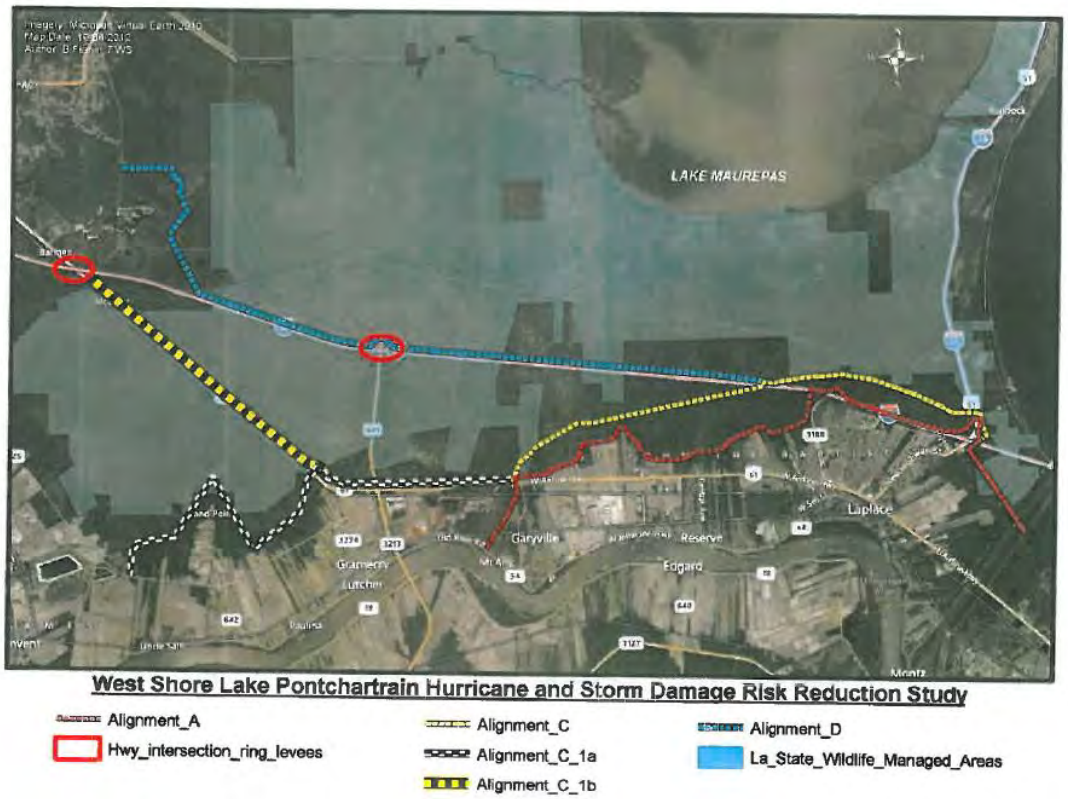


Figure 7-19. Critical landscape features.

Corps' LACPR map of Critical Landscape Features including the Maurepas Land Bridge which would benefit from the Blind River and Hope Canal Diversions.

Figure 2. Proposed revised alignments for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study.



USFWS recommendation for a levee alignment alternative for St. James Parish.

Adequacy of the Feasibility Report and DEIS (SMART Planning Process)

Aside from the communities' real needs for flood protection, it is necessary to discuss the legal aspects of the FS and DEIS. This report is the first report to be released by the New Orleans District following General Walsh's directive for reports to be complete within three years. We applaud General Walsh for recognizing the need to accelerate project development, and improvements should be made; however, it is not clear to LPBF if the General's SMART Planning Process can supersede the Congressional mandates of NEPA, in which case this report may not be actionable, or may be doomed to endless litigation by many others who see this as a dangerous national precedent. Therefore, we feel it is incumbent on LPBF to point out the apparent significant deficiencies in this report, since the current report is likely to delay flood protection.

The key deficiencies:

- The costs for the TSP and particularly for the alignment D alternative are likely to be vastly underestimated. Since there is no estimate of the number, types or operational considerations for water control structures, it is impossible to have any remotely reliable cost estimate for Alignment D.
- There is no estimate of the induced flooding for any of the alternatives. This is particularly troubling with the locally preferred plan of the D alignment, in which surge storage equal to 12% the size of Lake Pontchartrain would be enclosed. This would increase surge into nearby communities such as French Settlement, and also increase surge from "lake tilting" to areas as far away as Mandeville and Slidell.
- There is no projection of indirect wetland impacts. This is particularly troubling with the locally preferred plan of the D alignment, in which 50,500 acres of wetland forest would be enclosed, and under which, with future sea level rise, would increasingly require water control structures be closed to prevent residents from flooding. This future operation is inevitable with even modest seal level rise and would increasingly change the flood periods of the swamp.

Recommendations

1) The **levee component** of the Tentatively Selected Plan should be approved for final design and construction. Construction should start as soon as possible.

2) St. James Parish protection should be re-assessed considering two levee alignments: the D alignment and a levee alignment near the wetland upland interface (similar to what was proposed by USFWS in 2009). This assessment must consider:

- Existing local communities
- The regional economic significance of the Baton Rouge/New Orleans Corridor
- The type, number, cost, and operational requirements of either alignment to accommodate the Blind River and Hope Canal Diversions to sustain cypress outside of the levee alignment.

3) True feasibility level analysis and complete EIS with more accurate cost determination should be performed for St. James Parish alternative levee alignments.

NEW RIVER SOIL AND WATER CONSERVATION DISTRICT

P.O. BOX 72
CONVENT, LOUISIANA 70723
(225)562-2335

October 3, 2013

Regional Planning and Environment Division –South
New Orleans District Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Sir:

Established in 1945, the New River Soil & Water Conservation District (SWCD) provides free services to citizens in Ascension, St. James, and Iberville parishes east of the Mississippi River. The Conservation District is a subdivision of state government and is governed by a board of directors.

The Natural Resource Conservation Service (NRCS) works in partnership with the New River SWCD to assist landowners in designing and applying conservation practices in order to preserve and enhance their soil and water resources and in resolving the environmental challenges they may encounter on their land. Keeping landowners and the general public informed about conservation programs is a top priority of the District.

The New River SWCD would like to take this opportunity to express our concern over the proposal favored by the U.S. Army Corps of Engineers, Alignment C, which was chosen over Alignment D. As you know, Alignment D will afford levee protection to St. James Parish and lower Ascension Parish, both of which suffered severe flooding during Hurricane Isaac last year. After reviewing the known facts, data, and the development and operational goals of the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options, the District Board of Supervisors of the New River SWCD agree that Alignment D is a better option than C for the people and natural resources in our district. Another option that we support, but was not presented for our consideration, is Alternative Alignment C-1b.

Alignment C, if chosen and implemented will alter the programs and agreements the district has with local landowners. We are also concerned about the effect on the soil and water resources in St James Parish. According to the Soil and Water Resources Conservation Act of 1977 16 U.S.C. 2001-2009, alternative methods for conservation, protection, improvement, or enhancement of soil and water resources (16 U.S.C. 2005). .....are to be in conjunction with State soil and water conservation agencies, conservation districts, and appropriate citizen groups. While this Act imposes no compliance requirements on Corps projects, the Corps and the NRCS do coordinate their activities under interagency agreements. As of this date, the New River SWCD, and the local NRCS, has not been contacted by the U.S. Army Corps of Engineers to discuss a proposal which would cause such a drastic effect on the natural resources within the district. Our projects and programs should be administered in a manner that will be compatible to local government and private programs and policies protecting our natural resources.

We also ask that you consider the negative effect Option C will have on endangered species such as the Correll's false dragonhead, a perennial that has been discovered here and has the ability to grow under current conditions and soil found in St James Parish. Perique is a unique and rare type of tobacco that comes exclusively from St James Parish. Its existence has been in jeopardy more than once, first in the late 1990s and then in 2005. It may have become "extinct" but a new era for Perique has begun. St James Parish is also home to the Belmont Indian Mound (http://wikimapia.org/7274459/Belmont-Indian-Mound).

St James Parish is rich in history, natural resources, culture and traditions that are irreplaceable. Option C has the potential to abolish this therefore; the New River SWCD strongly supports Option D or Alternative Alignment C-1b . We ask you to take into consideration our knowledge and experience in working with the resources and citizens in this area as a basis for our decision.

Thank you for this opportunity to express our concerns. You may reach the New River Soil and Water Conservation District at (225)562-2335 or by contacting the Natural Resources Conservation Service at (225) 473-7638, extension 3.

Sincerely,

Ozane Gravois

Ozane Gravois, Chairman

New River Soil and Water Conservation District

Copies sent 10/9/13 PD

Louisiana Refining Division

Marathon Petroleum Company LP

Post Office Box AC
Garyville, LA 70051-0849
Tel: 985.535.2241

October 8, 2013

Attn: Sandy Office of Colonel Richard Hansen
Fax #: 504-862-1259

Hi Sandy

Per our conversation of earlier today, please find attached a copy of the letter addressed to Colonel Richard L. Hansen titled "West Shore Lake Pontchartrain, Louisiana Hurricane and Storm Damage Risk Reduction Project."

The original of this letter has been Fed Ex to Colonel Richard L. Hansen's office under Fed Ex Tracking Number 7968 6336 5534.

Please confirm receipt of this fax at 985-535-7187 or jzeringue@marathonpetroleum.com.

Sincerely,

Janice T. Zeringue
Human Resources - Assistant

A. J. Anderson, Jr.
Manager
Louisiana Refining Division

Marathon Petroleum Company LP

P.O. Box AC
155 Sugar Cane Road
Garyville, LA 70051
Tel: 985.535.2241

October 7, 2013

Colonel Richard L. Hansen
Commander and District Engineer
New Orleans District
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160

SUBJECT: **West Shore Lake Pontchartrain, Louisiana**
Hurricane and Storm Damage Risk Reduction Project

Dear Colonel Hansen:

I write on behalf of Marathon Petroleum Company's Louisiana Refining Division to express support for "Alternative D" in the West Shore Hurricane Protection Project.

As you know, Alternative D provides an additional 10 miles of levee protection when compared to "Alternative C," the plan currently favored by the Army Corps of Engineers. Alternative D would protect several more local communities and critical infrastructure, including pipeline crossings and many additional miles of Interstate 10. Importantly, it is the only option that would effectively provide levee protection to St. James Parish, where many employees of our refinery in Garyville reside.

Given the additional flood protections afforded at relatively modest cost, I respectfully urge the Army Corps of Engineers to select Alternative D for the West Shore Hurricane Protection Project.

Sincerely,

Alton "Bubbie" Anderson
Division Manager

cc: The Honorable Timmy Roussel

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☒ **No** ☒ No Speaking tonight

Comments: Concerned about the expedited process
Concerned that Lines of Defense alignment not chosen because of costs of pipelines. Protect Blind River + Globally priceless Mangrove Swamps
Support Lines of Defense alignment - Ring Levees, not Impoundment
Impounding the Land makes us sink Makes pumping worse
Can't repeat mistakes of New Orleans + Morganza Levee Systems → New Orleans Marsh Fire Hurts Air Quality
New Orleans needs $6 Billion to fix these drainage probs
Need levees quickly, Go with Ring Levee option

Name Scott Eustis **Affiliation** Gulf Restoration Network
Street 541 Julia St **Phone** 504 525 1528 x 212
City, St Zip New Orleans LA **Fax**
E-mail scott@healthygulf.org

NGO_9-10-2013_2_Scott Eustis

NUCOR

NUCOR STEEL LOUISIANA LLC

September 30, 2013

Colonel Richard Hansen
New Orleans District
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

RE: Letter Offered in Support of St. James Parish for Levee System Proposal

Dear Colonel Hansen:

Nucor Steel Louisiana LLC ("NSLA") would like to extend its support of St. James Parish's efforts to have the U.S. Army Corps of Engineers ("USACE") implement further modification/expansion of the levee system within the Parish.

NSLA is in the final phase of construction of a $750 million Direct Reduced Iron ("DRI") facility located in Convent, St. James Parish along the Mississippi River. This is phase 1 of a potential 5 phase project that could total over $3 billion dollars and employee over 1000 team members. Once operational the phase 1 facility will employee 150 team members and produce 2.5 million tons of DRI to be used as a raw material source for Nucor's other divisions. Of the 150 team members, approximately 70% reside in the River Parishes and approximately 30% are from St. James Parish.

Having seen firsthand, as recently as last year, the impact of flooding in the region it is imperative that the levee system be maintained/expanded to provide protection to the people and assets located in the Parish. We are currently analyzing the magnitude of potential impacts of flooding to our plant, the surrounding community, and to our teammates that live in St. James Parish.

As the process moves forward, we will be engaged with other business leaders, Parish officials, and the community to fully understand the plan and how we may be affected. We would ask that the USACE evaluate not only residential impact but overall economic impact that flooding would cause on businesses and the employment in the area.

Sincerely,

Lester Hart
General Manager

Received By
CEMVN-EX
US Army Corps of Engineers
New Orleans District

OCT 7 2013

PAR_8-26-2013_1_Cleve Hardman

JAY DARDENNE
LIEUTENANT GOVERNOR

State of Louisiana
OFFICE OF THE LIEUTENANT GOVERNOR
DEPARTMENT OF CULTURE, RECREATION & TOURISM
OFFICE OF STATE PARKS

CHARLES R. DAVIS
DEPUTY SECRETARY

STUART JOHNSON, PH.D.
ASSISTANT SECRETARY

August 26, 2013

Dr. William P. Klein, Jr.
U.S. Army Corps of Engineers
Regional Planning and Environment Div. South
New Orleans Environmental Branch
ECMVN-PDN-CEP
P.O. Box 60267
New Orleans, LA 70160-0267

Re: West Shore-Lake Pontchartrain Draft Environmental Impact Statement

Dear Dr. Klein,

I am in receipt of your draft environmental impact statement (EIS) for the West Shore-Lake Pontchartrain Hurricane and Storm Damage Risk Reduction. The Division of Outdoor Recreation administers the Land and Water Conservation Fund (LWCF) for Louisiana.

Our staff has identified seven LWCF-assisted sites within the project study area, one in St. John the Baptist Parish, six in St. James Parish and none in St. Charles Parish. Those sites are identified in the enclosed document along with GPS coordinates of each site. Our review of the draft EIS indicates none of the existing LWCF-assisted sites within the project study area would be impacted by any of the alternative plans. Indeed these sites are currently at risk unless action is undertaken to address the risk of hurricane and storm damage in this region.

We stand ready to assist in any means possible toward realization of these efforts.

Sincerely,

Cleve Hardman
Director of Outdoor Recreation

Enclosure

LWCF-Assisted Sites Within Project Study Area

Project Number	Project Name	Latitude (N)	Longitude (W)
22-00447	St. John Parish Park (East Bank)	30.07979	-90.5691
22-00451	Lutcher Park	30.050278	-90.702778
22-00473	Gramercy Park "B"	30.05465	-90.68499
22-00475	Gramercy Park "A"	30.054444	-90.691944
22-00495	Blind River Boat Ramp	30.101944	-90.735833
22-00525	Lutcher Hi Ball Park	30.0505	-90.6969
22-00828	Lutcher Park	30.050278	-90.702778

Creel, Travis J MVN

From: Jason Amato [jason.amato@stjamesla.com]
Sent: Thursday, August 08, 2013 8:47 PM
To: AskTheCorps MVN
Subject: St. James Parish - alignment D

Dear Sirs,

Please accept this email in support of Alignment D hurricane protection levee that will protect St. James Parish from flooding.

With kindest regards,
Jason P. Amato
St. James Parish Councilman
District 2

Sent from my iPad

St. James Parish Government

P. O. Box 106
Convent, Louisiana 70723-0106
(225) 562-2300 (225) 265-3156
TDD: (225) 562-8500

Timothy P. Roussel
Parish President

September 10, 2013

Colonel Richard Hansen, Commander
New Orleans District
United States Army Corps of Engineers
P. O. Box 60267
New Orleans, LA 70160-0267

Colonel Hansen:

We appreciate the Corps calling for a public hearing to allow the officials and residents of St. James Parish to address the West Shore Lake Pontchartrain Feasibility Report and Environmental Impact Statement. Thank you for the opportunity to provide information and questions towards the recommendation of the Corps moving from the Tentative Selected Plan (TSP) of Alignment C to the locally preferred plan of Alignment D. We respectfully request this material is implemented into the official record of the study.

Needless to say, St. James Parish residents are very nervous and afraid of the present situation that we are faced with, added to the datum of National Flood Insurance Program (NFIP) rules from the Biggert-Waters Act of 2012. Understand that our officials and residents together will fight for adequate structural flood protection whether done through the Corps or if we implement "our Plan B" and build levees meeting FEMA requirements. We also have for your reference three prints from different sources depicting how St. James Parish will be affected if we do not implement adequate flood protection.

Again, thank you for allowing the officials and residents of St. James Parish to participate in the 45-day comment period.

Sincerely,

Timothy P. Roussel
President
St. James Parish

TR/mog
Attachments

Comments on the Corps' West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study dated August 2013

GENERAL COMMENTS:

1. The Study area seems to be based on political boundaries and not hydrologic boundaries. Why did the Corps not study the hydrologic basin and just a part of it based on political boundaries? This alone seems to indicate a lack of understanding of the "water" problems in the area. If authority is the problem, why didn't the Corps request a Congressional Resolution that would have provided authority that would have enabled them to study the flooding problems in the hydrologic basin instead of just part of it. Furthermore, in some of the items in the environmental appendix, they seem to include Ascension Parish in the study area. This is confusing since the authority does not specifically include Ascension Parish. If you were to look at the watershed or basin, the solutions might be somewhat different that what was evaluated in this study by limiting the study area to the artificial political boundaries.

2. Throughout the report there are statements that indicate that additional analysis will be done prior to completing the final report. Is the public going to be provided an opportunity to review the additional analysis will be undertaken during the feasibility-level design and provided in the final report before it is submitted for processing? The impression one gets from reading this draft is that the Corps jumped to conclusions before completing their analysis.

3. The graphics included in the report are at a scale that they are hard to read at best if not impossible to read and understand. The graphics should be larger so one can understand what they are supposed to portray.

4. There is no mention in the infrastructure write-ups about the myriad of pipelines that traverse the study area. These are significant for distribution of energy resources and a number of them also tie into some of the industries within the study area. Many of these are designed to be buried but, in time, may be in water or exposed to saline conditions. There are both economic and safety considerations that should be addressed and included in this analysis. Structural protection for the St James Parish area would go a long way in providing for that.

5. The report needs to do a better job explaining why when any of the levees are built that you aren't making conditions upstream or in the neighboring parishes worse. In other words, explain where the water goes. There is a perception and it implies in the report that your proposed actions are making conditions worse for the neighboring parishes (Ascension and Livingston). Conditions in St. James Parish will be made worse by

implementation of the tentatively selected plan. Please clarify and explain in detail in the report.

6. The benefit analysis seems to focus primarily on structures that are flooded, yet in the report it alludes to a number of other benefits that do not appear to be captured in the Economic Analysis. For example, where are the benefits captured for roads that are protected that allow for employees to be able to access the various industries where they might be employed? Is there anywhere where the down time for industries is captured because employees can't get to their place of employment? How about the spike in fuel costs throughout the region and nation as a result of shutting down the refineries?

7. In the report write-up there is not one mention of Perique tobacco. Perique is a type of tobacco from Saint James Parish, Louisiana, known for its strong, powerful, and fruity aroma. When the Acadians made their way into this region in 1776, the Choctaw and Chickasaw tribes were cultivating a variety of tobacco with a distinctive flavor. A farmer named Pierre Chenet is credited with first turning this local tobacco into what is now known as Perique in 1824 through the technique of pressure-fermentation. According to Wiliam Rense, the entire world supply of this type of tobacco is grown in St. James Parish on an area of several hundred acres near the small communities of Grand Point, Paulina, and Belmont. This is a unique agricultural crop. The production does have an economic impact and if saline storm surge waters are allowed to penetrate into the area that crop could become history.

8. Given the recommendation of the tentatively selected plan in the draft report, one can assume that the Corps has made a conscious decision to allow the wetlands in the wildlife management area to eventually be converted to open water as sea level rises and subsidence take its toll rather than build a levee (as in Alternative D) to try to manage and maintain much of those wetlands for an extended period of time, perhaps another 100 years or so. Has there been any thought given or analysis done for a scenario of protecting and preserving the wetlands on the interior of a leveed system and managing those wetlands which would also protect the I-10 evacuation route and accomplish another study objective?

SPECIFIC COMMENTS:

Page 1-3, middle of the page - The write-up talks about the disrupted port logistics, blocked facility access and oil refineries being shut down. It also cites the spike in fuel prices and the agricultural losses due to storm surges. Where are the potential benefits for prevention of these with protection captured in the benefit analysis? If it is not captured and reflected in the economics, why was it not captured? Please explain.

Pages 2-2 and top of 2-3 - Does the sea level rise information used in the analysis reflect the latest information developed by NOAA and released in a report dated December 2012? Earlier this year there were articles in the newspapers indicating Louisiana's coast has some of the highest sea level rise in the world. How was this latest information factored into the development of the plan?

Page 2-4 – There is no mention of General Andrew Jackson having dammed Bayou Manchac at the river in 1814, to prevent the British from gaining a backdoor entrance into New Orleans. Before being severed from the river, this distributary helped nourish the Manchac swamps surrounding Lake Maurepas. That **federal action** (which was never authorized by Congress) has contributed to the eventual demise of many of the wetlands in the Maurepas basin. It was the source of fresh water from the Mississippi River that nourished those wetlands. Those wetlands helped dampen the impacts of storm surges over the years. The degrading over time mentioned at the top of page 1-4 is, to a large extent, due this federal action.

Page 2-9 (just before Table 2-5) – Field approximations sounds like somebody's guess and gives the impression there is a lot of room for error. Why were these not measured more precisely and surveyed?

Bottom of page 9 – There are a lot of other industries and businesses in the study area, (such as the Nucor plant under construction, the Gramercy Aluminum plant [formerly Kaiser], the sugar mill, etc.), please explain why those cited were selected to be highlighted in the report and the others were not.

Page 2-11, top of page. – FIRMS are already being updated and insurance premiums are rising. Without levees and protection from storm surges, people will not be able to afford the flood insurance. The impacts cited are more direct than indirect if no action or the proposed action is taken.

Page 2-12 – Weren't portions of I-10 inundated during Hurricane Katrina? That should be addressed in this section since it impeded flood fighting, recovery and repopulation of the area.

It also sounds like damages to transportation infrastructure would be a direct impact from no action. Wasn't one of the objectives of the study to reduce the risk of damage and loss of critical infrastructure, specifically the hurricane evacuation routes? (See page 1-6)

Isn't this one of the critical needs objectives?

Page 2-13 – The times cited in the table for potential transportation impacts are very optimistic. To those that actually experienced the problems with trying to go anywhere, it was much worse than you are indicating. Doubling those times would probably be more accurate. How was that incorporated into the economic analysis and benefits?

Page 2-26, 1.4.7 para 3 - It is noted that Tezcuco Plantation is in Ascension Parish which is outside of the "authorized" study area.

Page 2-29 – The potential impact on pipelines should be included in the analysis. In one plan alone (Plan D), there are some 70 pipelines, many of them in St. James Parish which will essentially be outside the protected area if the TSP remains as the recommended plan. By not protecting and allowing storm surges there will be more rapid deterioration of those pipelines.

Page 3-7 and 3-8 - It is noted that neither Plan a nor Plan C reduce risk to infrastructure in St. James Parish. Simply put, Plans that do not accomplish this are unacceptable to us.

Page 3-9 - We note that only Plan D provides a level of risk reduction to a segment of I-10 in St. James Parish. Since this is one of the objectives of the study and the only plan that satisfies this objective, why does this not lend added weight to Plan D being the tentatively selected plan? Please explain.

Page 3-10 - Once again, it appears that your analysis is incomplete and you are providing costs based on various assumptions which could easily change when your analysis is complete. We request the opportunity to again review your results when you complete your WVA analysis.

Page 4-2 – Alternative C has the potential to increase stages to the areas exterior to the levee. This is a recognition of induced damages in St. James, Ascension, and Livingston parishes. Given that same logic, one can surmise that all of the alternatives considered would do likewise. How is the Corps planning to mitigate those damages? The last statement of that paragraph seems to contradict what is being admitted earlier, but in a very non-definitive manner by saying it is not anticipated. It really sounds like you just aren't sure what will happen. We request that you provide a better explanation of your rationale.

Page 4-3 – You are saying here that there is no induced flooding based on your ADCIRC model. However, in other parts of the report you say there is induced flooding. Please explain and clarify.

Page 4-3 – Since the levee alignment extends outside of the authorized project area into Ascension Parish, if this alignment were recommended, would it be acceptable to tie into a non-Federal levee that probably is designed to different standards that the current Corps standards? Where would the Federal project end, since the levee continues beyond the authorized limits of the project? A good explanation and clarification of this is requested.

Page 4-6 – The impact of raising or acquisition of structures, particularly business structures impact not only employment but also negatively impact the tax base of the parish. There should be a map in this document that either shows the specific structures identified or at least the area where these structures are located. You obviously already know this since you claim to have a 100 percent inventory of the structures on the east bank of the parish.

Page 4 -7 - Section 4.2.4 Transportation It is noted that only Alternative D would fully meet the stated study objective of reducing the risk and loss of critical infrastructure, more specifically the hurricane evacuation routes that are critical for New Orleans and the surrounding area for evacuation and repopulation after a storm event. Alternatives A and C would not satisfactorily accomplish this. An impassible interstate/evacuation route could potentially also contribute to loss of life. It also directly impacts post storm response as well as repopulation of the area. There also does not seem to be any benefits captured in the analysis to reflect any of this.

Page 4 - 8 - online 4 "storm sure damage " should be "storm surge damage"

Page 4 – 8 - Since this is a draft feasibility report, when are the feasibility level design efforts going to be accomplished? It would seem appropriate for that to have already be done as part of the feasibility report. If this is going to be accomplished later, will the public be afforded an opportunity to comment and provide feedback? If not, please explain why not.

Page 4-13 - You state that the Floristic Quality Index being used throughout the world. Why then is it not acceptable to the Corps or is the WVA system of analysis so institutionally entrenched that it must also be done. This seems, on the surface, to be duplication of analytical effort that the taxpayers are footing the bill for. Please explain what is actually required by your Corps' regulations and by law.

Page 4-12 – It should be clarified that Blind River is a state-designated Wild and Scenic River since there is also a similar federal program

Page 4- 15 – Since you did not complete a WVA, what you are presenting in the report may or may not be on target. It appears that there was a lot of rationalization done to support preconceived conclusions. Once again, we want to review your results after you have completed your WVA.

Page 5-1 – The 1571 structures including the 90 that would be bought out would have a significant disruptive impact on the communities in which these are located. More detail should be included in this draft plan and that should be publicly vetted. The Corps needs to be more sensitive to the people of the area and their communities.

Page 5-2, top of page – Suggest revising the statement to read " thBCR is 1.63 to 1 with benefits of approximately $23 million."

Page 5- 2 The local folks have a right to know if their property is slated to be acquired or raised. It seems like right now, you can't tell them because you really don't know. Why are you delaying doing this as part of the feasibility level design and analysis? Isn't this supposed to be a feasibility study? Why don't you have answers? The public has a right to know and if you haven't gotten far enough yet, you are premature in releasing this draft report.

Page 5-3 – There is a sentence that states "the non-structural component would be less effective because structures would have to be raised to a height that would increase their risk from wind damage during a storm." That is not an acceptable solution because you are doing nothing but trading off water damage for wind damage but not realistically reducing the risk of our residents. In addition you are forcing them to accept paying higher premiums for flood insurance that no one can afford. This is problematic and unacceptable.

Page 5-6, top of page – When will the public have the opportunity to review the mitigation plan that is not included in this draft report?

Appendix B Engineering

Page 15 - There is a reference to EC1165-2-211 dated 2009 but the latest guidance seems to be dated 1 October 2011 on the Corps publications web site. That seems to be indicate that the analysis used outdated information.

Appendix E Economics

Page 1-3 of the main report talks about disrupted port logistics, loss production of refineries, agricultural losses, etc. Where are these benefits captured in the economic analysis for the project?

From Principles and Guidelines for Water Resources Implementation Studies - 1983

Each alternative plan is to be formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability. Appropriate mitigation of adverse effects is to be an integral part of each alternative plan.

(4) Acceptability is the workability and viability of the alternative plan with respect to acceptance by State and local entities and the public and compatibility with existing laws, regulations, and public policies.

West Shore Lake Pontchartrain
Hurricane and Storm Damage Risk Reduction Study
August 2013

1. The Initial Array of Alternatives (Section 3.4 page 3-3) identifies 12 alternative plans for structural measures. Only 2 of the 12 plans include structural alternatives for St. James Parish. These plans are further discussed in Appendix E – Plan Formulation of the report. All of these plans refer to "Linkages to Past WSLP efforts"; however, none are more recent than 2007 (which predates Hurricanes Gustav, Ike and Isaac). **Why are there no additional alternatives included in the study that take into account recent storm or flooding events?** In a planning aid letter (PAL) dated October 9, 2012, from the US Fish and Wildlife Service, additional alternatives were recommended for consideration other than the three preliminary levee alignments. Alignment C-1a extends Alignment C along the wetland/non-wetland interface up to LA3125 west of Grand Point, while Alignment C-1b extends Alignment C along Airline Highway to its intersection with I-10. Neither of these alternatives appear to have been vetted, or even considered, in your study. These alternatives meet the purpose and need statement of the study and fall within the objectives and constraints listed in the plan formulation. **We request an explanation as to why these alternatives were not considered in this study.**

2. An order of magnitude assessment of Alternatives C-1a was performed by St. James Parish to investigate its benefits and costs. The largest benefit is the elimination of a large acreage of indirect mitigation costs. According to Table K-1 in Appendix A Annex K, the Alignment D indirect mitigation costs (15%) is approximately $5,827/acre ($327,687,626 / 56,228 acres). According to the USFWS Planning Aid Letter, Alignment C-1a has enclosed wetlands of approximately 20.5 square miles (13,120 acres). This equates to an indirect mitigation cost of $76,461,260 for Alignment C-1a. All other categories used in developing costs are similar to Alignment D. Alignment C-1a's cost is close to $650 million. This drastic change in cost alone warrants additional investigation into this alignment. **We request that the USFWS Alignments C-1a and C-1b, or variations thereof, be added and fully vetted through this study process.**

3. It appears that storm surge modeling was only conducted to determine required levee elevations for each alignment. The Appendix B – Engineering, Storm Surge Modeling section discusses the process for calibrating models and including relative sea level rise. No mention of pre-development and post development modeling was made in this study. **How can the impacts and benefits of each Alignment be compared if the post development conditions are not modeled? Will building Alignment C have additional impact to St. James Parish?** The study models only calculates storm surge with current conditions to set levee heights. **Will flood elevations rise for St. James Parish if Alignment C is constructed? We request pre and post development storm surge modeling be performed for all Study Alignments.**

Congress of the United States
Washington, DC 20510

August 29, 2013

Colonel Richard Hansen, Commander
New Orleans District
United States Army Corps of Engineers
Post Office Box 60267
New Orleans, LA 70160-0267

Dear Colonel Hansen:

We appreciate the opportunity to provide comments on the West Shore Lake Pontchartrain Feasibility Report and Environmental Impact Statement. This region plays a vital role in the national economy supporting key navigation and energy industry assets such as the Port of South Louisiana, the largest volume port in the Western Hemisphere, and a number of major oil refineries. While we are encouraged by the progress that has been made on the feasibility study, we have serious concerns about the Tentatively Selected Plan (TSP) and urge you to carefully review the merits of Alternative D before submitting your recommendation.

Alternative C, with an expected cost of $881 million, will provide structural protection for 16,919 structures and four miles of Interstate 10. This cost estimate includes $305 million for non-structural measures outside the levee system that will protect 1,571 structures in the communities of Gramercy, Lutcher, and Grand Point. While Alternative D is projected to cost $10 million more, the levee system will encompass 4,921 additional structures and 11 more miles of Interstate 10. Supplemental, related benefits noted in the study for areas inside the levee system include higher property values, increased tax revenues, and a greater potential for economic growth.

Furthermore, in accordance with the authorizing language, the study area is confined to St. Charles, St. John the Baptist and St. James Parishes, wholly excluding the benefits afforded to businesses and residents in Ascension Parish that will also be protected under Alternative D. It is our understanding that this could include another 5,000 housing units and 13,000 residents, and we encourage you to make note of these associated benefits that have not been factored into the Benefit-Cost-Ratio calculation.

We recognize the Army Corps of Engineers' commitment to fully funding the feasibility study in the current fiscal year and support your efforts to complete this study in an expeditious manner. Throughout this public comment period, we know that you will determine and recommend the alignment that produces the maximum return on investment, and we look forward to assisting you in that process.

Sincerely,

Mary L. Landrieu
United States Senator

David Vitter
United States Senator

Bill Cassidy
Member of Congress

Cedric Richmond
Member of Congress

The following resolution was offered and moved for adoption by Councilman St. Pierre and seconded by Councilman Amato:

RESOLUTION 13-143
ST. JAMES PARISH COUNCIL

A RESOLUTION REQUESTING THAT THE U. S. CORPS OF ENGINEERS RECONSIDER THEIR RECOMMENDATION FOR THE WEST SHORE LAKE PONTCHARTRAIN HURRICANE PROTECTION LEVEE AND CHOOSE ALTERNATIVE D

WHEREAS, South Louisiana has experienced an increase in flooding and flood damages in recent years from major hurricanes and other tropical weather conditions; and,

WHEREAS, the parishes of Southeastern Louisiana have worked hard to rebuild their communities and often times have shared resources, man-power, and equipment to aid and assist one another during flooding disasters; and,

WHEREAS, the economic growth and stability of our Region depends on adequate protection from storms and flooding in all of the parishes in Southeastern Louisiana; and,

WHEREAS, the recently released Corps of Engineers' West Shore Lake Pontchartrain Study recommends Alternative C as the tentatively selected plan; and,

WHEREAS, Alternative C provides for a levee from the Bonnet Carre Spillway to the Hope Canal and the Mississippi River in Garyville, Louisiana, thereby, leaving an area of approximately 10 miles from western St. John Parish to Ascension Parish without federal hurricane protection levees; and,

WHEREAS, Alternative C provides no hurricane levee protection to St. James Parish, which will force backwater flooding to Blind River and into homes, businesses, and industries within St. James Parish; and,

WHEREAS, the West Shore Lake Pontchartrain Study notes that the difference in cost from Alternative C to Alternative D is approximately $10.2 million; and,

WHEREAS, Alternative D provides a continuous hurricane protection levee from St. Charles Parish to Ascension Parish, thereby, closing the gap in the levee system and providing a complete West Shore Lake Pontchartrain Hurricane Levee System:

NOW, THEREFORE, BE IT RESOLVED, by the St. James Parish Council, that the governing body of St. James Parish hereby requests that the Corps of Engineers reconsider their recommendation of Alternative C and [illegible] within the River Parishes through the selection

* * * * *

CERTIFICATE

I, Angele R. Rodrigue, Secretary of the Council of the Parish of St. James, State of Louisiana, hereby certify that the foregoing is a true and correct copy of a resolution adopted by the St. James Parish Council in regular meeting held on the 4th day of September 2013.

Signed at Vacherie, Louisiana, this the 5th day of September 2013.

Angele R. Rodrigue
Secretary

(S E A L)

2013-0327

INTRODUCED BY: V.J. ST. PIERRE, JR., PARISH PRESIDENT
ST. CHARLES PARISH COUNCIL

RESOLUTION NO. 6015

A resolution requesting the Louisiana United States Congressional delegation, Louisiana State Delegation, and the U.S. Army Corps of Engineers to consider and support the Alignment D alternative contained in the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study

WHEREAS, the U. S Army Corps of Engineers has evaluated the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study; and,

WHEREAS, the Feasibility Study did include the evaluation of protection of St. James Parish and the other River Parishes from Tropical Storm and Hurricane Storm Surge; and,

WHEREAS, the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study provided that the Locally Preferred Alignment 'D' would be in best interest to St. James Parish, Ascension Parish, St. Charles Parish and St. John the Baptist Parish; and,

WHEREAS, the impacted area includes millions of dollars of residential property in addition to heavy industrial and commercial property utilized in the production of oil, gas and chemical products critical to the nation's economy; and,

WHEREAS, the U. S. Army Corps of Engineers has tentatively chosen Alignment C and has provided a 45 day period for public comment ending October 7, 2013; and,

WHEREAS, the residents of Montz are currently without adequate flood protection and it is a priority of St Charles Parish to obtain flood protection for all residents of the Parish; and,

WHEREAS, it is crucial for the residents of St Charles Parish to contact the U. S. Army Corps of Engineers, U. S. Congressional Delegation and Louisiana State Delegation to request consideration of Alignment D.

NOW, THEREFORE, BE IT RESOLVED, THAT WE, THE MEMBERS OF THE ST. CHARLES PARISH COUNCIL do hereby strongly request the Louisiana United States Congressional delegation, Louisiana State Delegation, and the U.S. Army Corps of Engineers to consider the Alignment D alternative contained in the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study.

BE IT FURTHER RESOLVED that a copy of this resolution be forwarded to the U. S. Army Corps of Engineers, Senator Mary Landrieu, Senator David Vitter, Congressman Cedric Richmond and Congressman Bill Cassidy, also State Senators Jody Amedee, Troy E. Brown, and Gary L. Smith, Jr., and Representatives Ed Price, Clay Schexnayder, Randal L. Gaines, John Berthelot, Greg Miller, and Eddie Lambert asking their assistance in this regard.

The foregoing resolution having been submitted to a vote, the vote thereon was as follows:

YEAS: SCHEXNAYDRE, FAUCHEUX, WILSON, WOODRUFF, BENEDETTO, HOGAN, COCHRAN, FLETCHER, FISHER-PERRIER
NAYS: NONE
ABSENT: NONE

And the resolution was declared adopted this 3rd day of September, 2013, to become effective five (5) days after publication in the Official Journal.

CHAIRMAN Wesley Benedetto
SECRETARY
DLVD/PARISH PRESIDENT September 5, 2013
APPROVED ✓ DISAPPROVED

PARISH PRESIDENT
RETD/SECRETARY September 5, 2013
AT 11:10 a RECD BY

RESOLUTION OF
EAST ASCENSION CONSOLIDATED GRAVITY DRAINAGE DISTRICT

A RESOLUTION REQUESTING THE LOUISIANA UNITED STATES CONGRESSIONAL DELEGATION, AND LOUISIANA STATE DELEGATION, ALONG WITH THE U. S. ARMY CORP OF ENGINEERS TO CONSIDER ALIGNMENT D TO INCLUDE ASCENSION PARISH IN THE LEVEE PROTECTION PROJECT

WHEREAS, the U. S. Army Corps of Engineers has evaluated the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study; and

WHEREAS, the Feasibility Study did include the evaluation of protection of Ascension Parish and the other River Parishes from Tropical Storm and Hurricane Storm Surge; and

WHEREAS, the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study provided that the Locally Preferred Alignment 'D' would be in best interest to Ascension Parish, St James Parish, St. Charles Parish and St. John the Baptist Parish; and

WHEREAS, the impacted area includes millions of dollars of residential property in addition to billions of dollars in heavy industrial and commercial property utilized in the production of oil, gas and chemical products critical to the nation's economy; and

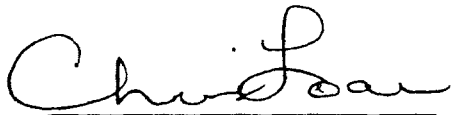
WHEREAS, the U. S. Army Corp of Engineers has tentatively chosen Alignment C and has provided a 45 day period for public comment ending October 7, 2013 ; and

WHEREAS, it is crucial for the residents of Ascension Parish to contact the U. S. Army Corp of Engineers, The Ponchartrain Levee District U. S. Congressional Delegation and Louisiana State Delegation to request consideration of Alignment D; and

NOW, THEREFORE, BE IT RESOLVED, by the East Ascension Consolidated Gravity Drainage District that the Louisiana Legislative Delegation of the United States Senate and Congress and the Louisiana State Delegation promote the consideration of Alignment 'D' which would be in the best interest of, Ascension Parish, St. James, St. Charles Parish and St. John the Baptist Parish; and

BE IT, FURTHER, RESOLVED that a copy of this resolution be forwarded to the U. S. Army Corp of Engineers, U. S. Senator Mary Landrieu, Senator David Vitter, Congressman Cedric Richmond and Congressman Bill Cassidy, also State Senator Jody Amedee, Troy Brown, and Gary Smith and Representatives Ed Price, Clay Schexnayder, Randal Gaines, John Berthelot and Eddie Lambert.

And, the resolution was declared adopted on this, 6th day of September, 2013.



Ascension Parish Council Chairman

RESOLUTION 18-13

A RESOLUTION REQUESTING THAT THE U. S. CORPS OF ENGINEERS RECONSIDER THEIR RECOMMENDATION FOR THE WEST SHORE LAKE PONTCHARTRAIN HURRICANE PROTECTION LEVEE AND CHOOSE ALTERNATIVE D

WHEREAS, South Louisiana has experienced an increase in flooding and flood damages in recent years from major hurricanes and other tropical weather conditions; and,

WHEREAS, the parishes of Southeastern Louisiana have worked hard to rebuild their communities and often times have shared resources, man-power, and equipment to aid and assist one another during flooding disasters; and,

WHEREAS, the economic growth and stability of our Region depends on adequate protection from storms and flooding in all of the parishes in Southeastern Louisiana; and,

WHEREAS, the recently released Corps of Engineers' West Shore Lake Pontchartrain Study recommends Alternative C as the tentatively selected plan; and,

WHEREAS, Alternative C provides for a levee from the Bonnet Carre Spillway to the Hope Canal and the Mississippi River in Garyville, Louisiana, thereby, leaving an area of approximately 10 miles from western St. John Parish to Ascension Parish without federal hurricane protection levees; and,

WHEREAS, Alternative C provides no hurricane levee protection to St. James Parish, which will force backwater flooding to Blind River and into homes, businesses, and industries within St. James Parish; and,

WHEREAS, the West Shore Lake Pontchartrain Study notes that the difference in cost from Alternative C to Alternative D is approximately $10.2 million; and,

WHEREAS, Alternative D provides a continuous hurricane protection levee from St. Charles Parish to Ascension Parish, thereby, closing the gap in the levee system and providing a complete West Shore Lake Pontchartrain Hurricane Levee System:

NOW, THEREFORE, BE IT RESOLVED, by the Mayor and Board of Alderman, that the governing body of Town of Gramercy hereby requests that the Corps of Engineers reconsider their recommendation of Alternative C and provide hurricane protection to all citizens, businesses, and industries within the River Parishes through the selection of Alternative D; and,

BE IT, FURTHER, RESOLVED that a copy of this resolution be forwarded to the members of the Louisiana Federal Delegation and the U. S. Senators, State Senators and Representatives who represent the River Region Area.

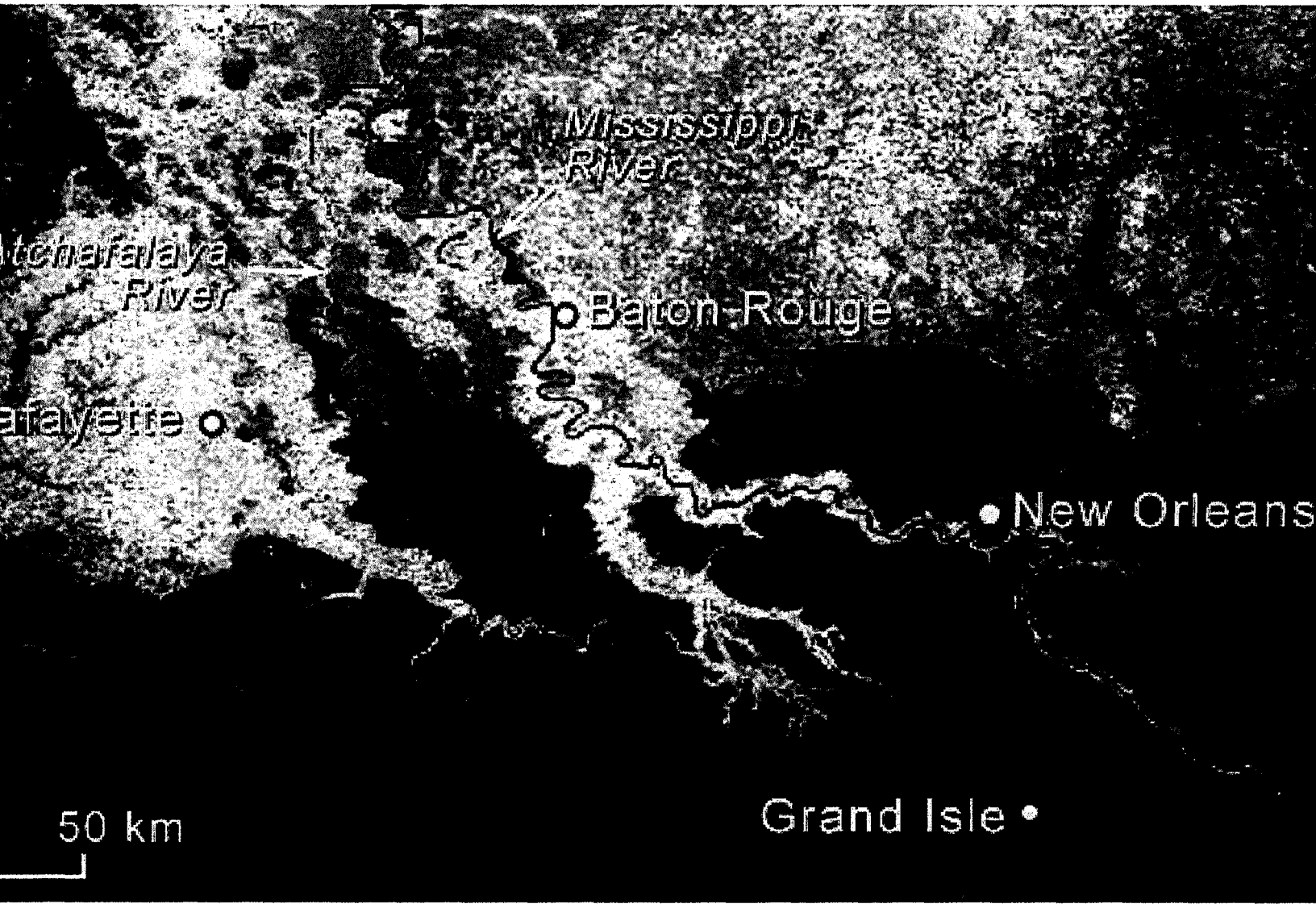
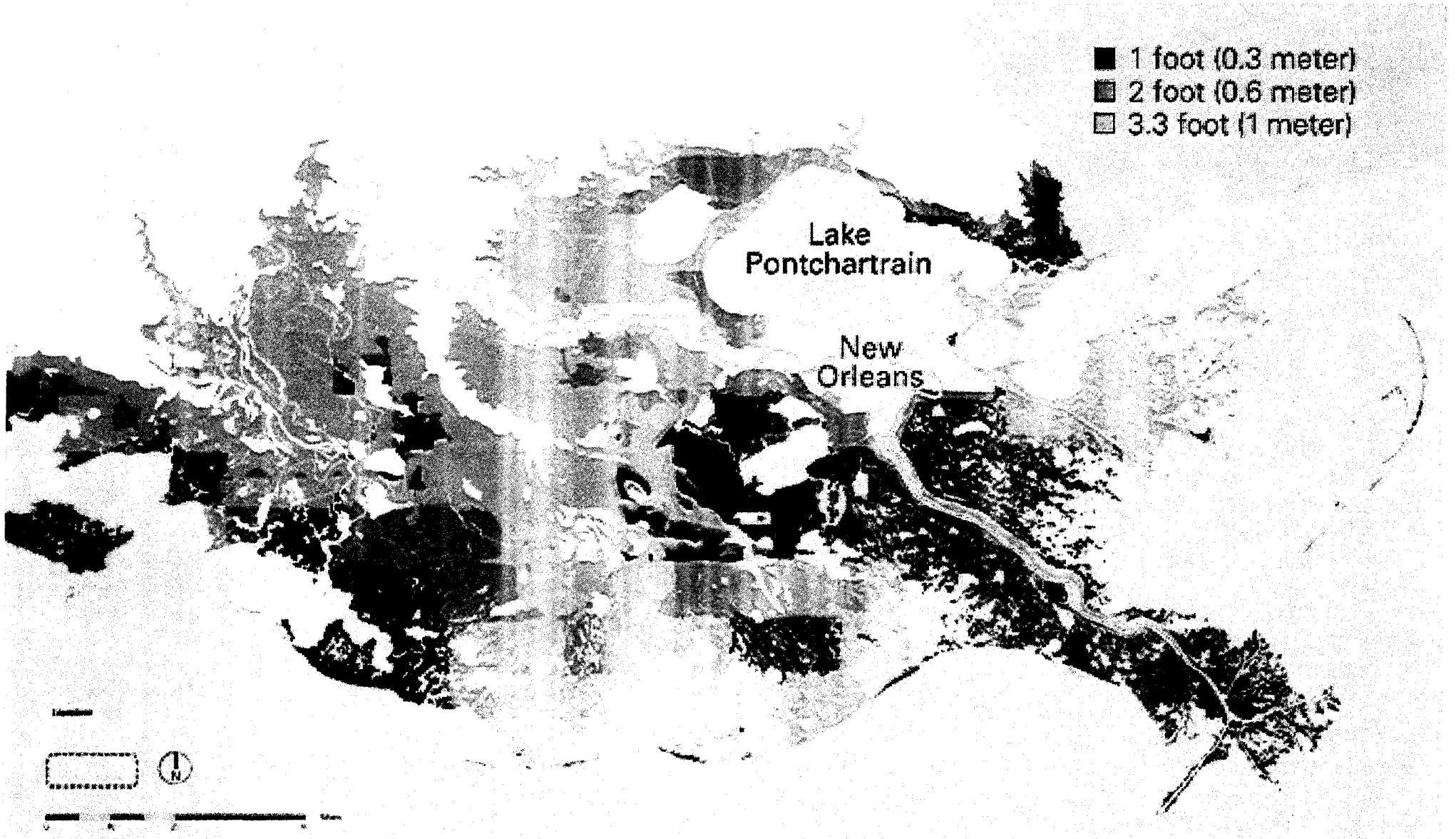

Mississippi River
tchafalaya River
Baton Rouge
ayette
New Orleans
50 km
Grand Isle

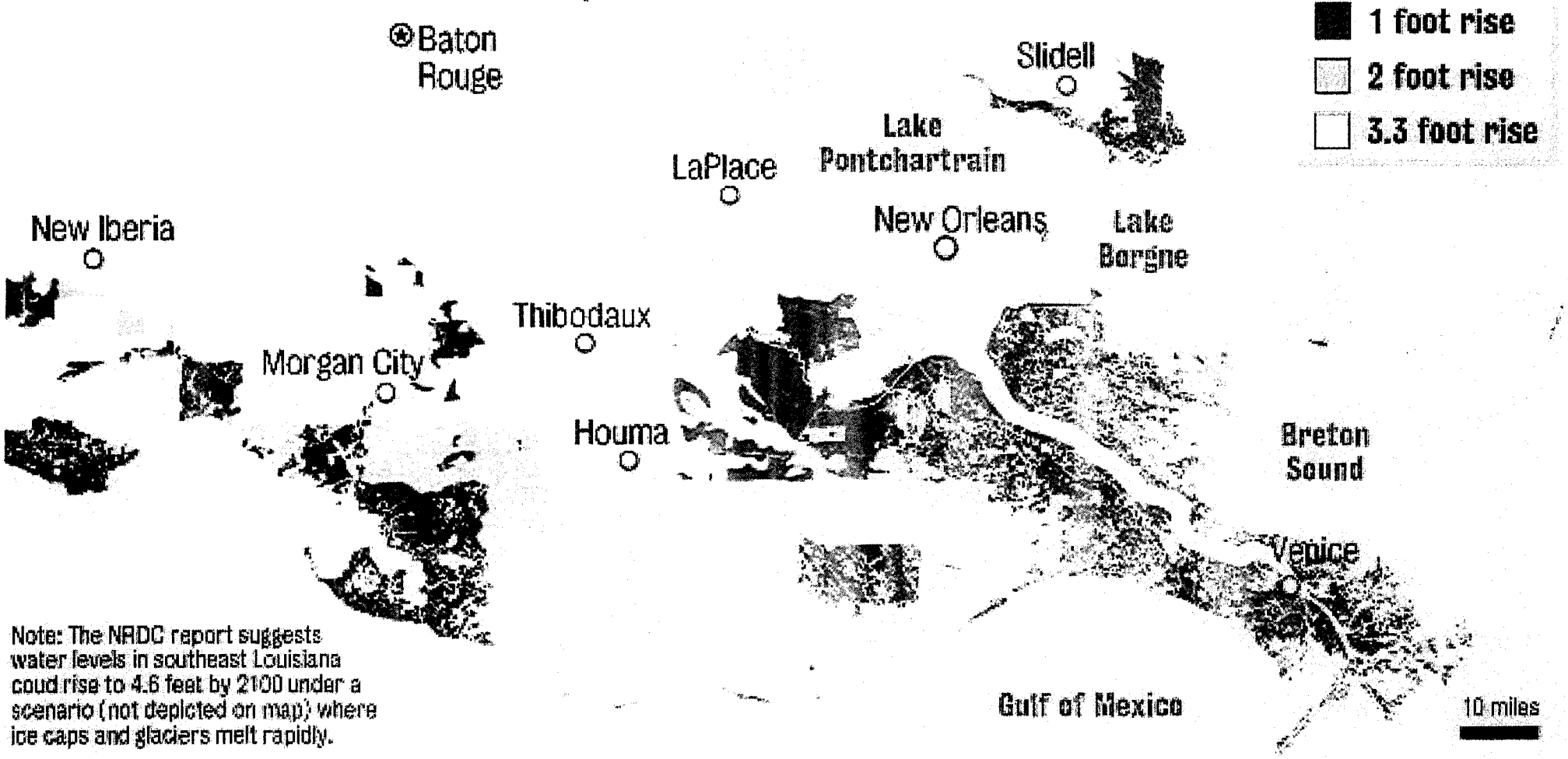
Figure 5.4: Potential wetland submersion by 2100



ource: Adapted from Carbonell and Meffert (see Appendix A)

HOW SEA LEVEL RISE COULD AFFECT SOUTHEAST LOUISIANA

Various coastal land loss scenarios depict dire future in 2100:



Note: The NRDC report suggests water levels in southeast Louisiana coud rise to 4.6 feet by 2100 under a scenario (not depicted on map) where ice caps and glaciers melt rapidly.

ource: Natural Resources Defense Council, Lincoln Institute of Land Policy

THE TIMES-PICAYUNE

PAR_9-25-2013_1_Jody Chenier

St. James Parish Government

P.O. Box 106
Convent, Louisiana 70723-0106
(225) 562-2300 (225) 265-3156
TDD: (225) 562-8500

Timothy P. Roussel
Parish President

September 25, 2013

Dr. William P. Klein, Jr.
U.S. Army Corps of Engineers
New Orleans District
P. O. Box 60267
New Orleans, LA 70160-0267

Dear Dr. Klein:

Attached please find the St. James Parish Coastal Zone resolution requesting the U.S. Corps of Engineers reconsider their recommendation for the West Shore Lake Pontchartrain Hurricane Protection Levee.

If you any questions or require additional information, please feel free to contact me at (225) 562-2262.

Sincerely,

Jody P. Chenier
Director of Operations

JPC:jrl

cc: Timothy P. Roussel, St. James Parish President
St. James Parish Councilmen

A RESOLUTION REQUESTING THE U. S. CORPS OF ENGINEERS RECONSIDER THEIR RECOMMENDATION FOR THE WEST SHORE LAKE PONTCHARTRAIN HURRICANE PROTECTION LEVEE

WHEREAS, St. James Parish has experienced an increase in flooding and flood damages in recent years from major hurricanes and other tropical weather conditions; and,

WHEREAS, the economic growth and stability of St. James Parish depends on adequate protection from future storms and flooding; and,

WHEREAS, the Corps of Engineers has notified the Parish that based on the West Shore Lake Pontchartrain Study, it will recommend Alternative C as the tentatively selected plan; and,

WHEREAS, Alternative C provides for a levee from St. Charles Parish to St. John Parish, leaving an area of approximately 10 miles of St. James Parish without a federal hurricane protection levee; and,

WHEREAS, the tentatively selected plan, Alternative C, provides no hurricane levee protection to St. James Parish, which will increase backwater flooding into homes, businesses, and industries within St. James Parish; and,

WHEREAS, the West Shore Lake Pontchartrain Study notes that the difference in cost from Alternative C to Alternative D is approximately $10.2 million; and,

WHEREAS, Alternative D provides a continuous hurricane protection levee from St. Charles Parish to Ascension Parish, thereby, closing the gap in the proposed levee system:

NOW, THEREFORE, BE IT RESOLVED that the St. James Parish Coastal Zone Committee hereby requests that the Corps of Engineers reconsider their recommendation of Alternative C and provide hurricane protection to all citizens, businesses, and industries within St. James Parish through the selection of Alternative D.

On a motion offered by Brandon Gravois and seconded by LeVar Joseph, the resolution was declared adopted on this 28th day of August, 2013.

Gerald Falgoust, Chairman

Craig Calcagno

C. J. Brock

Brandon Gravois

Edward Arceneaux

Clarence Bazile

LeVar Joseph

Elton Chenier

St. James Parish Government

P. O. Box 106
Convent, Louisiana 70723-0106
(225) 562-2260
FAX (225) 562-2279
TDD: (225) 562-8500

Timothy P. Roussel
Parish President

September 26, 2013

Colonel Richard Hansen
New Orleans District
U.S. Army Corps of Engineers
P. O. Box 60267
New Orleans, LA 70160-0267

RE: West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Feasibility Study

Dear Colonel Hansen:

This letter is to officially inform the USACE that St. James Parish will be providing information that will change the Benefit to Cost ratio on Table 3-5. St. James Parish is collecting information from Parish industries to determine the economic impact to their facilities during and after a flooding event. These numbers and information will give the USACE a loss of production during the occurrence or aftermath of hurricanes or other surge events if St. James Parish is not included in proposed flood protection.

Please be prepared to receive this information in the next few weeks to add to the continuing study of the tentative decision by the USACE. If you require any further explanation, please do not hesitate to contact us.

Sincerely,

Timothy P. Roussel
Parish President

cc: Mr. Steve Wilson, Pontchartrain Levee District

TR/mog

Jody P. Chenier
Director of
Operations

Chantal T. Waguespack
Director of
Finance

Michelle Nailor-Octave
Director of
Human Resources

Eric S. Deroche
Director of
Emergency Preparedness

ST. CHARLES PARISH

TRACI A. FLETCHER
COUNCILWOMAN, DISTRICT VI

September 20, 2013

U.S. Army Corps of Engineers

Attention: Ms. Patricia Leroux

P. O. Box 60267

New Orleans, LA 70160-0267

RE: West Shore Lake Pontchartrain Hurricane

And Storm Damage Risk Reduction Study

Dear Ms. Leroux,

I am writing to express my support of the Locally Preferred Alignment D alternative contained in the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study. I feel that this alignment would be in the best interest of all entities involved and would greatly support the livelihood of Ascension Parish, St. James Parish, St. John Parish, and St. Charles Parish.

I appreciate the U.S. Army Corps of Engineers favorable consideration and support of Alignment D.

With warmest regards, I am

Very sincerely yours,

Traci A. Fletcher

Traci A. Fletcher

St. Charles Parish Council: District 6

Office
St. Charles Parish
P.O. Box 302
Hahnville, LA 70057
(985) 783-5000
Fax: (985) 783-2067
http://www.stcharlesparish-la.gov

Residence
411 Wild Rose Drive
Norco, LA 70079
Phone: (985) 307-0120
Fax: (985) 307-0163
Cell: (504) 579-9297
E-mail: tfletcher@stcharlesgov.net

October 5, 2013

US Army Corps of Engineers, New Orleans District
C/O Public Affairs
CEMVN-PAO
PO Box 60267
New Orleans, LA 70160-0267

To whom it may concern,

We are writing to you to voice our concerns about the proposed levee system that has been selected and is awaiting approval. As a resident of St. James Parish we are concern about the negative and possibly devastating results this plan could have on our home and our life.

Our Parish President, Mr. Timmy Roussel says you lack data from our Parish. This is a concern to us. What kind and how much data would be needed to change you're minds and have you choose Plan D which would include us?

We are providing you with pictures of the homes and streets in our subdivision for consideration as data. These pictures were taken during Hurricane Isaac (3 days after the hurricane past through and some a week after the water came in). The subdivision is called Longview Subdivision which consists of Longview Street, Carly Lane and Carolyn Drive in Paulina.

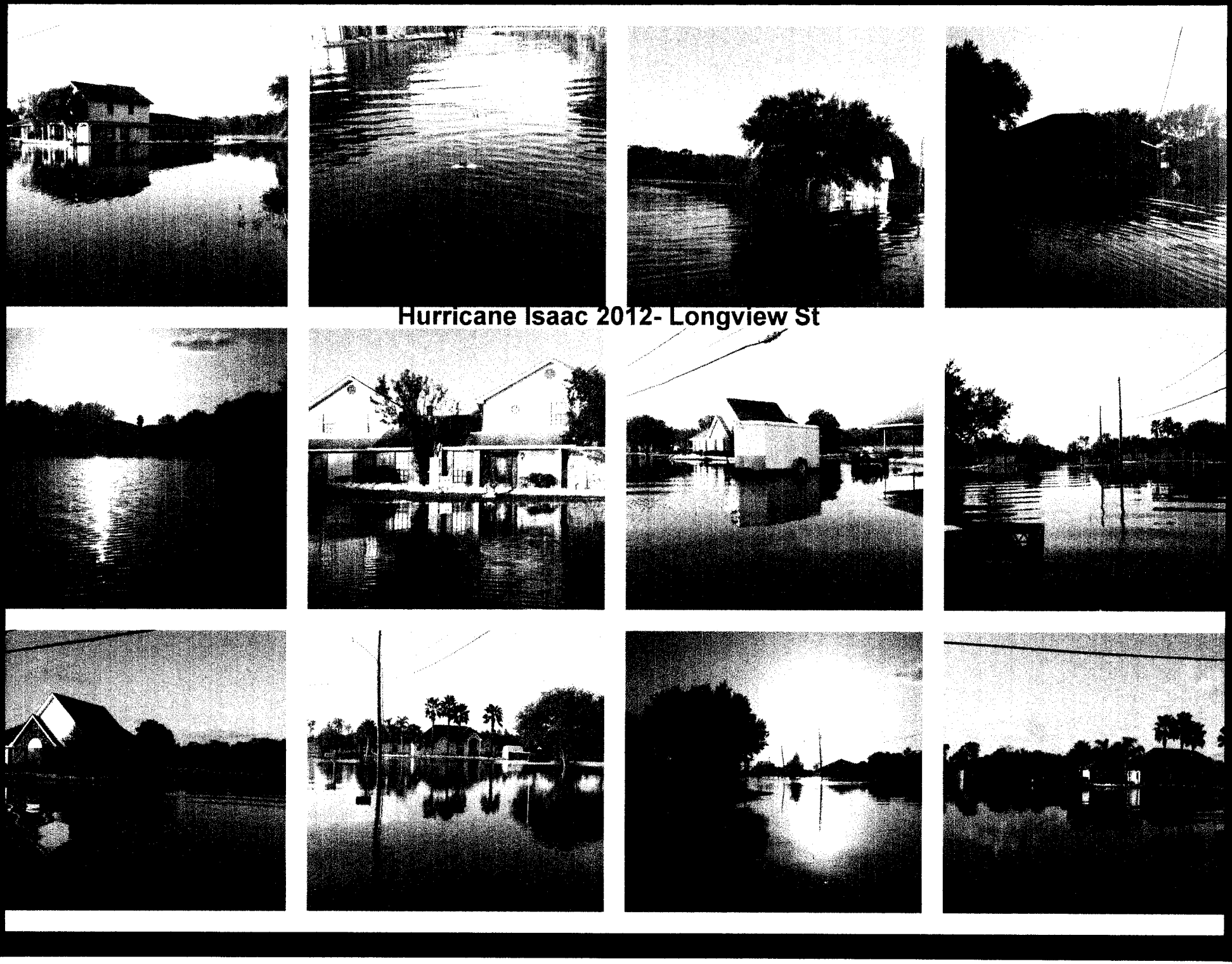
I would also like to state that if there were little or no FEMA claims filed from our area, we can assure you that it was not from a lack of devastation. In our opinion the lack of claims was due to the joint efforts of a community. Sandbags by the thousands were filled and brought to homes. Pumps were set up for those most vulnerable to water entering their homes.

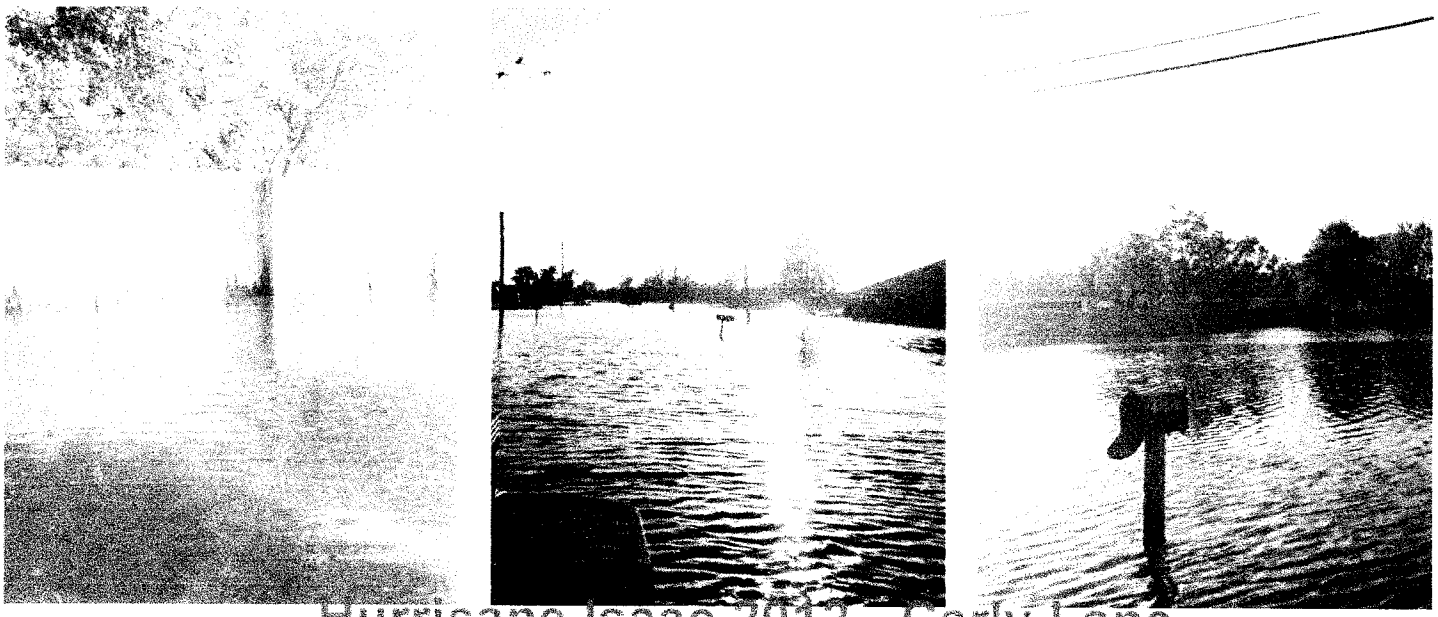
We fear that if Plan D is not chosen then what we experienced during Hurricane Isaac will be nothing compared to what may happen should the proposed levee system you are considering be approved. We remain very concerned and uncertain about our future in St. James Parish.

Sincerely,

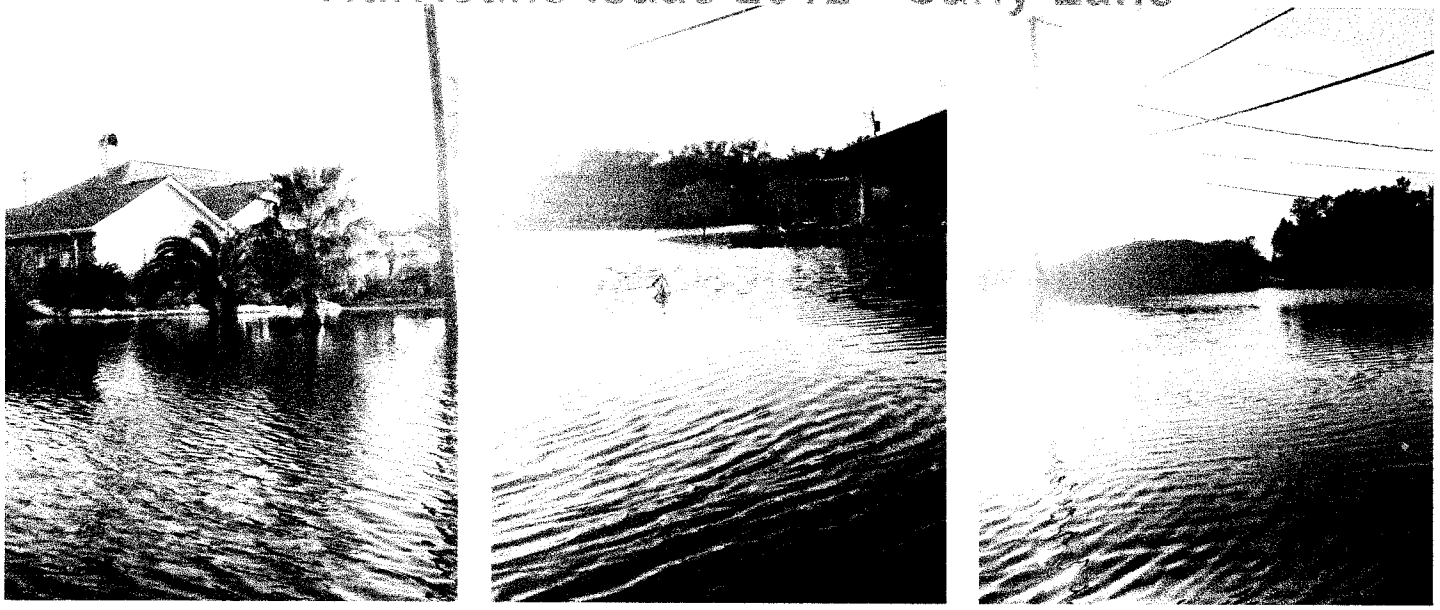
James and Rose Lucas
32474 Carolyn Drive Paulina, LA 70763

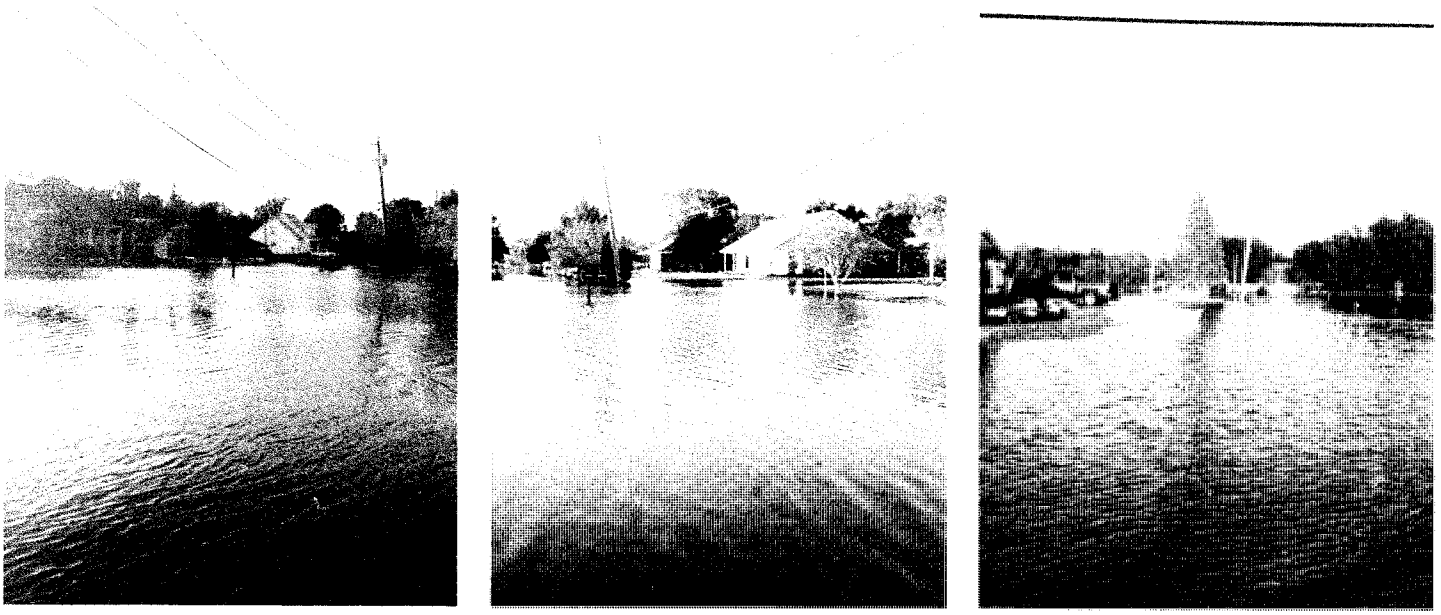
Hurricane Isaac 2012 - Longview St

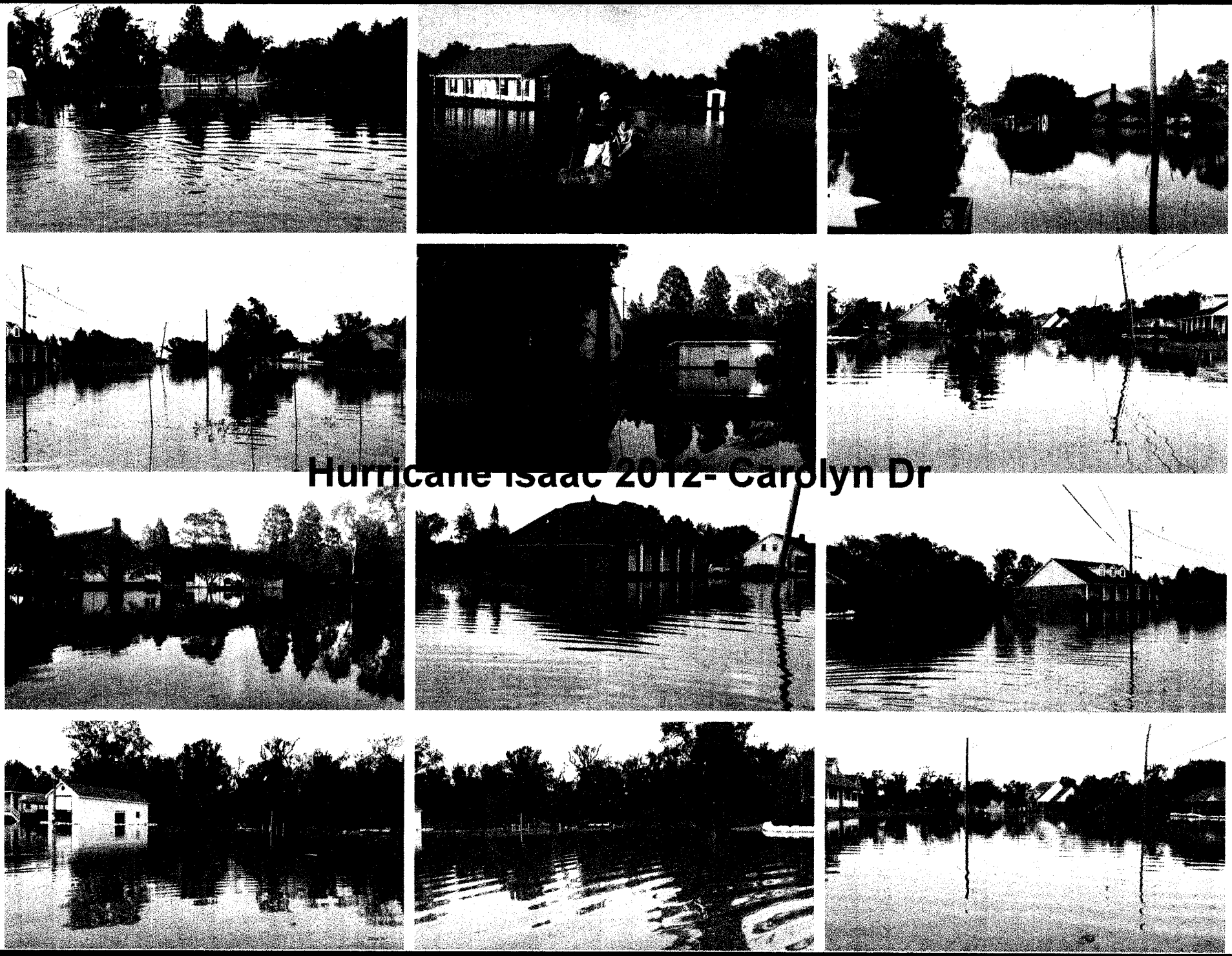

Hurricane Isaac 2012- Longview St



Hurricane Isaac 2012 - Carly Lane






Hurricane Isaac 2012- Carolyn Dr

Hurricane Isaac 2012 - one week later

Date: 10-4-13

Name: Robert P. Ruiz Jr

Address: 3652 Kenmore Dr.
Paulina, LA. 70763

US Army Corps of Engineers, New Orleans District
c/o Public Affairs
CEMVN-PAO
P.O. Box 60267
New Orleans, LA 70160-0267

Dear US Army Corps of Engineers:

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.

Sincerely,

Robert Ruiz

Date: 10-7-13

Name: Kristie Hutchinson
Address: 2475 N. Albert
Luteher, LA 70071

US Army Corps of Engineers, New Orleans District
c/o Public Affairs
CEMVN-PAO
P.O. Box 60267
New Orleans, LA 70160-0267

Dear US Army Corps of Engineers:

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.

Sincerely,

Kristie 2 Hutchinson

Creel, Travis J MVN

From: GARLAND J POCHE [gspoche@bellsouth.net]
Sent: Friday, July 26, 2013 10:28 AM
To: AskTheCorps MVN; amedeej@legis.la.gov; brownte@legis.la.gov; schexnayderc@legis.la.gov; pricee@legis.la.gov
Subject: Flood protection for St.James Parish

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Corps and State Legislators,

As residents of St. James Parish Louisiana, we implore you to consider ALIGNMENT D when making decisions about flood protection for the river parishes. If a protection levee is built only as far as St. John Parish then the flood waters from Lake Pontchartrain have no place to go but to our parish. Please think about the rich farmlands and major industries as well as households that would be affected by your plans. We pray that God gives you the courage to make the decision that will protect all people of our area from the danger of flooding from a major hurricane.

St. James Parish residents,
Garland & Sharon Poche
1876 Felicity Ct.
PO Box 295
Lutcher, LA 70071

Creel, Travis J MVN

From: Wayne Boudreaux [wayne_dana@att.net]
Sent: Friday, July 26, 2013 9:38 PM
To: AskTheCorps MVN; amedeej@legis.la.gov; brownte@legis.la.gov; schexnayderc@legis.la.gov; pricee@legis.la.gov
Subject: Flood Protection

Follow Up Flag: Follow up
Flag Status: Flagged

To Whom It May Concern:

I am writing to ask that you help me fight for flood protection of the homes of my family and friends by supporting Alignment D of the flood protection propositions.

Thank you,

Dana Boudreaux

Creel, Travis J MVN

From: Jennifer Madere [jennifer.madere@yahoo.com]
Sent: Friday, July 26, 2013 9:37 PM
To: AskTheCorps MVN; amedeej@legis.la.gov; brownte@legis.la.gov; schexnayderc@legis.la.gov; pricee@legis.la.gov
Subject: Flood Protection Fight

Follow Up Flag: Follow up
Flag Status: Flagged

I am writing to ask that you help me fight for flood protection of our parish by supporting Alignment D of the flood protection fight.

Jennifer Madere

Creel, Travis J MVN

From: Carol Bourgeois [carolannebour@yahoo.com]
Sent: Friday, July 26, 2013 12:39 PM
To: AskTheCorps MVN
Subject: Support Alignment D

Follow Up Flag: Follow up
Flag Status: Flagged

As a resident of St. James Parish, I urge you to protect the residents of the East Bank of the Mississippi River by selcting Alignment D of the West Shore Lake Ponchartrain Hurricane and storm Damage Risk Feasibility Study

Carol Bourgeois
Resident of Gramercy, LA

Creel, Travis J MVN

From: Harris & Gaynell Louque [harrislouque@cox.net]
Sent: Saturday, July 27, 2013 8:54 PM
To: AskTheCorps MVN
Subject: ALIGNMENT D FOR ST JAMES PARISH

Follow Up Flag: Follow up
Flag Status: Flagged

Please help us by choosing Alignment D to provide hurricane protection for ALL the River Parishes, including St. James Parish.

Thanks for choosing Alignment D.

Gaynell & Harris Louque, Jr.

Creel, Travis J MVN

From: Bernie Robichaux [bernierobichaux@gmail.com]
Sent: Monday, July 29, 2013 7:48 PM
To: AskTheCorps MVN; pricee@legis.la.gov; schexnayderc@legis.la.gov; brownt@legis.la.gov; amedeej@legis.la.gov
Subject: Alignment D

Follow Up Flag: Follow up
Flag Status: Flagged

Please press forward to impress upon the U.S. Army Corps of Engineers to implement Alignment D in regards to flood protection for St. James Parish. This will provide the most protection for the citizens of our parish. Please support us as we support you.

Thanks,
Bernie Robichaux

Creel, Travis J MVN

From: David Robichaux [davidrobichaux@gmail.com]
Sent: Monday, July 29, 2013 7:44 PM
To: AskTheCorps MVN
Subject: Alignment D

Follow Up Flag: Follow up
Flag Status: Flagged

Please press forward to impress upon the U.S. Army Corps of Engineers to implement Alignment D in regards to flood protection for St. James Parish. This will provide the most protection for the citizens of our parish. Please support us as we support you. Thank you for all of your efforts of serving the community.

David Robichaux
St. James Parish

Creel, Travis J MVN

From: Chad.Weidert@motivaent.com
Sent: Tuesday, July 30, 2013 11:58 AM
To: AskTheCorps MVN
Subject: Support of Alignment "D"

Follow Up Flag: Follow up
Flag Status: Flagged

I am in support of Alignment “D” of the West Shore Lake Pontchartrain (WSLP) Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) Study.
Please consider Alignment “D” as the method flood protection that benefits a larger area of residents.
I am a resident of St. James Parish.

Regards,

Chad M. Weidert

Shell Chemical LP
Norco Plant, 15536 River Road, Norco, L A 70079-0010

Tel: +15044656128 6128
Email:
Internet: http://www.shell.com

Creel, Travis J MVN

From: Jamie McBride [jamiemmcbride@yahoo.com]
Sent: Saturday, August 10, 2013 11:08 AM
To: AskTheCorps MVN; amedeej@legis.la.gov; brownte@legis.la.gov; schexnayderc@legis.la.gov; pricee@legis.la.gov
Subject: Flood protection

To whom it my concern,

Please press forward to impress upon the U.S. Army Corps of Engineers to implement Alignment D in regards to flood protection for St. James Parish. This will provide the most protection for the citizens of our parish. Please support us as we support you. Thank you for all of your efforts of serving the community.

Sincerely,
Jamie Hoormann
Resident of St. James Parish

Creel, Travis J MVN

From: Napa [wanapa@bellsouth.net]
Sent: Monday, August 12, 2013 10:23 AM
To: AskTheCorps MVN
Subject: [EXTERNAL] Alingment D

Please go with alignment D . St. James parish future depends on it.

Tk

Creel, Travis J MVN

From: Louque, Dean M. (MPC) [dmlouque@marathonpetroleum.com]
Sent: Wednesday, August 14, 2013 4:34 PM
To: AskTheCorps MVN; 'brownte@legis.la.gov'; 'amedeej@legis.la.gov'; 'schexnayderc@legis.la.gov'; 'pricee@legis.la.gov'
Subject: [EXTERNAL] Flood Protection

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study. To ensure my family and property are secure during the event of a hurricane or tropical storm, I am requesting your assistance to promote the option Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.

It is crucial that members of our community, as well as our local officials, congressional and state representatives join to work towards the goal of keeping the entire river region safe.

Thanks

Dean Louque

Paulina,La.

Creel, Travis J MVN

From: Hotard, Benny (MPC) [hbhotard@marathonpetroleum.com]
Sent: Wednesday, August 14, 2013 3:47 PM
To: AskTheCorps MVN; 'brownte@legis.la.gov'; 'amedeej@legis.la.gov'; 'schexnayderc@legis.la.gov'; 'pricee@legis.la.gov'
Subject: [EXTERNAL]

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study. To ensure my family and property are secure during the event of a hurricane or tropical storm, I am requesting your assistance to promote the option Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.

It is crucial that members of our community, as well as our local officials, congressional and state representatives join to work towards the goal of keeping the entire river region safe.

Hanson Hotard
5327 CANATELLA ST.
Convent, La. 70723

Creel, Travis J MVN

From: Bienvenu, Joseph M. (MPC) [jmbienvenu@marathonpetroleum.com]
Sent: Wednesday, August 14, 2013 3:28 PM
To: AskTheCorps MVN; 'brownte@legis.la.gov'; 'amedeej@legis.la.gov'; 'schexnayderc@legis.la.gov'; 'pricee@legis.la.gov'
Subject: [EXTERNAL]

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study. To ensure my family and property are secure during the event of a hurricane or tropical storm, I am requesting your assistance to promote the option Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.

It is crucial that members of our community, as well as our local officials, congressional and state representatives join to work towards the goal of keeping the entire river region safe.

Kind Regards,

Joseph Bienvenu

2207 South Nobile Street

Paulina La. 70763

Joseph Bienvenu
Mechanical Technician
Marathon Petroleum Company

Creel, Travis J MVN

From: Martin, Cindy (MPC) [ctmartin@marathonpetroleum.com]
Sent: Wednesday, August 14, 2013 8:29 AM
To: AskTheCorps MVN; brownte@legis.la.gov; amedeej@legis.la.gov; schexnayderc@legis.la.gov; pricee@legis.la.gov
Subject: [EXTERNAL] Flood Protection

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study. To ensure my family and property are secure during the event of a hurricane or tropical storm, I am requesting your assistance to promote the option Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.

It is crucial that members of our community, as well as our local officials, congressional and state representatives join to work towards the goal of keeping the entire river region safe.

Cindy Martin

32105 Longview Street

Paulina, Louisiana 70763

Creel, Travis J MVN

From: St. Pierre, Marc J. (MPC) [mjstpierre@marathonpetroleum.com]
Sent: Thursday, August 15, 2013 12:51 PM
To: AskTheCorps MVN; 'brownte@legis.la.gov'; 'amedeej@legis.la.gov'; 'schexnayderc@legis.la.gov'; 'pricee@legis.la.gov'
Subject: [EXTERNAL]

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study. To ensure my family and property are secure during the event of a hurricane or tropical storm, I am requesting your assistance to promote the option Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.

It is crucial that members of our community, as well as our local officials, congressional and state representatives join to work towards the goal of keeping the entire river region safe.

Marc St. Pierre
Electrical Tech Zone 4
Marathon Petroleum Company

Creel, Travis J MVN

From: Martin, Kenny M. (MPC) [kennymmartin@marathonpetroleum.com]
Sent: Thursday, August 15, 2013 11:35 AM
To: AskTheCorps MVN; 'brownte@legis.la.gov'; 'amedeej@legis.la.gov'; 'schexnayderc@legis.la.gov'; 'pricee@legis.la.gov'
Subject: [EXTERNAL] Flood Protection

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study. To ensure my family and property are secure during the event of a hurricane or tropical storm, I am requesting your assistance to promote the option Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.

It is crucial that members of our community, as well as our local officials, congressional and state representatives join to work towards the goal of keeping the entire river region safe.

Kenny Martin
32105 Longview Street
Paulina, Louisiana 70763

Creel, Travis J MVN

From: Hines, Courtney J. (MPC) [chines@marathonpetroleum.com]
Sent: Thursday, August 15, 2013 8:48 AM
To: AskTheCorps MVN; 'brownte@legis.la.gov'; 'amedeej@legis.la.gov'; 'schexnayderc@legis.la.gov'; 'pricee@legis.la.gov'
Subject: [EXTERNAL] levee protection

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study. To ensure my family and property are secure during the event of a hurricane or tropical storm, I am requesting your assistance to promote the option Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.

It is crucial that members of our community, as well as our local officials, congressional and state representatives join to work towards the goal of keeping the entire river region safe.

Courtney Hines

Creel, Travis J MVN

From: Copponex, Johnathan E. (MPC) [jecopponex@marathonpetroleum.com]
Sent: Monday, August 19, 2013 7:08 AM
To: AskTheCorps MVN; 'brownte@legis.la.gov'; 'amedeej@legis.la.gov'; 'schexnayderc@legis.la.gov'; 'pricee@legis.la.gov'
Subject: [EXTERNAL]

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study. To ensure my family and property are secure during the event of a hurricane or tropical storm, I am requesting your assistance to promote the option Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection for St. James Parish. Alignment A and C would begin a levee in St. Charles Parish and stop short of the St. James Parish line, leaving St. James Parish unprotected and vulnerable to flooding.

It is crucial that members of our community, as well as our local officials, congressional and state representatives join to work towards the goal of keeping the entire river region safe.

Thanks,
Johnathan Copponex
3344 La 642
Paulina La 70763

Thanks,
John Copponex

Mechanical Advisor
Marathon Petroleum Company LP
Phone# 985-535-7282
Fax# 985-742-6300
jecopponex@marathonpetroleum.com <mailto:jecopponex@marathonoil.com>

Creel, Travis J MVN

From: Karen D [kdfbmail@gmail.com]
Sent: Friday, August 02, 2013 8:37 AM
To: brownte@legis.la.gov; AskTheCorps MVN; amedeej@legis.la.gov; schexnayderc@legis.la.gov; pricee@legis.la.gov; melissa.wilkins@stjamesla.com
Subject: Choose Option D/Flood Protection Plan/St. James Parish

I reside and own a small business in St. James Parish. I live in Longview Subdivision which is located in Paulina. My area was adversely affected by Isaac. We all sandbagged and had standing water for a number of days. Residents manned pumps 24/7 to protect their homes. Some still had flood waters get into their homes. It is comforting to have the protection of the National Guard, yet still unnerving at the same time. You have to go through what we did to understand that last statement. I hope no one will have to. Please support Option D in the proposed flood protection plans to protect St. James Parish residents.

Thanking you kindly in advance for your support and cooperation in this matter.

Karen Dunn
225-206-7290 Cell
225-869-8618 Home
kdfbmail@gmail.com

Creel, Travis J MVN

From: albert739@cox.net
Sent: Friday, August 02, 2013 8:28 AM
To: AskTheCorps MVN
Subject: hurricane protection

I am in favor of Alignment D for hurricane protection for St. James Parish.

Pastor Nolan W. Albert
Home Ph. (225) 869-5135
Cell Ph. (225) 454-4483
Email: Albert739@cox.net

Creel, Travis J MVN

From: Blake Luminais [bluminais@gmail.com]
Sent: Friday, August 23, 2013 12:09 PM
To: AskTheCorps MVN; amedeej@legis.la.gov; browte@legis.la.gov; schexnayderc@legis.la.gov; info@cedricrichmond.com
Subject: [EXTERNAL] St James Parish flood protection

I writing in response to the recent announcement of the Army Corps' selection of the West Shore Lake Pontchartrain flood protection proposal. This selection only increases the flood risk of the residents of St James Parish. Although the numbers of flood claims in the parish following last storm may not have been as high as St John, hundreds of homes were in risk. Myself, along with MANY other residents of the parish, spent the days following the storm sandbagging subdivisions and stopping water from entering houses. It was a humbling experience that I wish all of you could have witnessed for yourself.

The problem with the West Shore Lake Pontchartrain selection is that the water that is prevented from entering St John parish will enter the neighboring parish of St James, which will have no protection. St James' other neighbor, Ascension Parish, has high capacity pumps which will only add to the flooding of St James. This is evident in the fact that St James parish did not flood unitl 3 days later when St John drained and Ascension pumped their water through Maurpas Swamp.

I am asking for your help to protect ALL of the residents in these flood prone areas. If not, flooding will only continue to be a domino effect from parish to parish.

Sincerely,
Blake Luminais
4387 La 3125
Paulina, LA 70763

Creel, Travis J MVN

From: dean.veron@motivaent.com
Sent: Saturday, August 24, 2013 8:29 AM
To: WSLPAdmin
Subject: [EXTERNAL] Protection levee

Follow Up Flag: Follow up
Flag Status: Completed

Please consider Alternative D to provide flood protection to all of us who need it. It seems like the floods keep moving further to the west of New Orleans as the years go by since the levees were built/enhanced to protect the New Orleans area. If you choose Alternative C you are going to push the flood waters to St. James and Ascension maybe even to EBR parish. What gives you the right to protect St. John and St. Charles and not us? I PAY TAXES TOO!!! Spend the money and do it right the first time.

Creel, Travis J MVN

From: Michael Corona [mpcoronakba@gmail.com]
Sent: Saturday, August 24, 2013 9:19 AM
To: WSLPAdmin
Subject: [EXTERNAL] Where will water go now? Will it go more North West towards French Settlement? Please responnd

Creel, Travis J MVN

From: Harrison Troxclair [htroxcl@gmail.com]
Sent: Saturday, August 24, 2013 6:53 PM
To: WSLPAdmin
Subject: [EXTERNAL] West Shore Lake Pontchartrain Study

I am a resident of Lutcher in St. James Parish, Louisiana. I disagree with the flood protection plan chosen by the corps of engineers (Alternative C) This may be the cheapest and best plan for St. John Parish but this will adversely affect St. James Parish should another storm similar to Isaac hits this area in the future. Storm waters that previously would spread out over a large area and not get very deep will be funneled into this parish and Ascension Parish. U.S. Highway 51 is one this area's major evacuation route but it is barely above sea level in this parish and has had water cover it in the past. Future water levels will be higher and possibly force closure of the escape route when needed most. There are industrial plants that possibly have dangerous materials stored at ground level that would be in danger of getting flooded and dispersed throughout this area,. Are the railroad beds elevated enough in St. James Parish to remain usable if the water level rises a foot higher than it did during Isaac? This proposed route of the flood protection system would only hurt this Parish and also Ascension Parish. "Protection" would not be the correct term to describe this projection for residents outside of St. John Parish. I urge whoever is in command of this project to reconsider the choice of Alternative C. I feel that this will be the death of the East bank of St. James Parish if this is the final route chosen Thanks for allowing the citizens affected the chance to comment.

Harrison Troxclair of 1319 Third Street, Lutcher, Louisiana 70071

E mail address: htroxcl@gmail.com

Creel, Travis J MVN

From: Shawn Brignac [shawn_brignac@yahoo.com]
Sent: Sunday, August 25, 2013 8:48 AM
To: WSLPAdmin
Subject: [EXTERNAL] River Parish Levee Option

I was disappointed to learn that option D was not selected. I have been living in the Gramercy for 16 years now, and lived in St. John parish for 25 years before that. Last year's hurricane Isaac was not the worst conditions of rains and tidal surge I have seen since living here in Gramercy. In 1998 tropical storm Francis dumped 24 inches of rain on us and like after every storm the water came up for about three days after. A week later hurricane George hit as a category 4 storm and the water backed up on us for three more days after it had passed. Those two systems together did not backup half as much water on us like Isaac did. After Isaac past, we didn't have any water in the streets and in our homes like in LaPlace. The water came up for about a week after, because it had no where else to go. I am not an engineer so I can't tell you why it happen but I do know things are different since St. Charles parish has a levee. I would like to sell my house, but I have three other homes for sale just on my block that has been on the market for some time now. If we won't get a levee, I would like to be paid for my home.

Shawn Brignac

Creel, Travis J MVN

From: casey.laiche@motivaent.com
Sent: Monday, August 26, 2013 6:23 AM
To: WSLPAdmin
Subject: [EXTERNAL] Alignment D the only choice

I'm writing to express concern over the west shore hurricane protection levee. I have seen options A,B,and C which exclude St. James Parish. The people of St. James parish need to have Alignment D to protect ST.James parish on the east bank. For Hurricane Isaac we saw water like never before and the water rose up my drive way and up to my house, if any other alignment is chosen we will surely flood drastically. Personally I cannot believe you all are considering any of the other alignments because ascension parish has pumps and levees and if St. John were to get the levee, its obvious we will be sitting on our roof tops waiting to be rescued for the next storm. Thank you for you time.

Signed a concerned citizen

Casey Laiche

Creel, Travis J MVN

From: Boyett, Ricky D MVN on behalf of AskTheCorps MVN
Sent: Monday, August 26, 2013 9:03 AM
To: WSLPAdmin
Subject: FW: [EXTERNAL] Alignment D- hurricane protection levee (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

-----Original Message-----
From: denise nosacka [mailto:denisenosacka@bellsouth.net]
Sent: Sunday, August 25, 2013 9:26 PM
To: AskTheCorps MVN
Subject: [EXTERNAL] Alignment D- hurricane protection levee

To Whom this May Concern,
I beg for your support in choosing Alignment D verses the current choice. It saddens me that you would not choose to do the job right one time. If we should have the misfortune of another storm such as Isaac, and we will in time given our location in hurricane season, the current choice will cause dramatically more flooding in our area. This is an area that has not had such issues in my lifetime until now. This solution will help St. John parish just as the levee that was built in New Orleans helped them. And the neighboring parish paid greatly for that. The same domino effect will continue if you proceed as planned. I will pray that this decision changes and allows protection for ALL!
Thank You,
Denise Nosacka

Classification: UNCLASSIFIED
Caveats: NONE

Creel, Travis J MVN

From: Ada Guidry [adaguidry@att.net]
Sent: Monday, August 05, 2013 2:35 PM
To: AskTheCorps MVN
Subject: Fwd: Approve Alignment D

Begin forwarded message:

From: Ada Guidry <adaguidry@att.net>
Subject: Fwd: Approve Alignment D
Date: August 5, 2013 2:23:45 PM CDT
To: landrieum@legis.la.gov

Begin forwarded message:

From: Ada Guidry <adaguidry@att.net>
Subject: Fwd: Approve Alignment D
Date: August 5, 2013 2:22:53 PM CDT
To: vitterd@legis.la.gov

Begin forwarded message:

From: Ada Guidry <adaguidry@att.net>
Subject: Fwd: Approve Alignment D
Date: August 5, 2013 2:21:58 PM CDT
To: richmondc@legis.la.gov

Begin forwarded message:

From: Ada Guidry <adaguidry@att.net>
Subject: Fwd: Approve Alignment D
Date: August 5, 2013 2:15:58 PM CDT
To: amedeej@legis.la.gov

Begin forwarded message:

From: Ada Guidry <adaguidry@att.net>
Subject: Fwd: Approve Alignment D
Date: August 5, 2013 2:15:27 PM CDT
To: brownte@legis.la.gov

Begin forwarded message:

From: Ada Guidry <adaguidry@att.net>
Subject: Fwd: Approve Alignment D
Date: August 5, 2013 2:14:46 PM CDT
To: schexnayderc@legis.la.gov

Begin forwarded message:

From: Ada Guidry <adaguidry@att.net>
Subject: Approve Alignment D
Date: August 5, 2013 2:13:24 PM CDT
To: pricee@legis.la.gov

To: U. S. Army Corps of Engineers' Public Affairs Office

- U. S. Senator Mary Landrieu
- U. S. Senator David Vitter
- U. S. Congressman Cedric Richmond
- State Senator Jody Amedee
- State Senator Troy Brown
- State Representative Clay Schexnayder
- State Representative Edward Price

In regards to the West Shore Lake Pontchartrain (WSLP) Louisana Hurricane and
Storm Damage Risk Reduction (HDSRR) Study we respectfully request you do the job you were elected to do and approve "Alignment D" to protect the entire

East Bank of St James Parish from flood waters.

Please help save our Parish and approve "Alignment D".

Thank You

Alvin Guidry and Ada Guidry
2200 Kinler Street
P O Box 81
Paulina , La 70763

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☑ **No** ☐

Comments: We have lived in Paulina, Louisiana for the last 8 years and have NEVER had problems with flooding. Our family invested over 300,000 dollars in a home in Bellevue Lakes Subdivision and can not afford higher insurance premiums. We are not required to have flood insurance because we are not in a flood area. Our home is a 2 story, brick structure that will not be able to be elevated. We actually moved from the Laplace area (Foxwood Manor Subdivision) to get away from the high waters during storms. The waters will have no where to go, and will flood St. James Parish. Please secure everyone with Option D!!!

Name Roland and Kenisha Anderson, JR. **Affiliation** Marathon Oil Worker

Street 2909 Bellevue Lakes Street **Phone** 225-869-6285

City, St Zip Paulina, LA 70763 **Fax**

E-mail roland and Kenisha @ bellsouth.net

Our family deserves it, Our children deserves it, our future depends on it!

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☒

Comments: HAS THE DOUBLE CANAL SPILLWAY BEEN CONSIDERED AS AN OPTION TO HANDLE THE SURGE FROM THE LAKES? THE SPILLWAY LEVEES MAY NEED TO BE RAISED TO CONTAIN THE INCREASED HEAD ELEVATION)

Name CLYDE DOOLEY **Affiliation** _____

Street 347 N. MILLET AVE **Phone** (225) 869-8585

City, St Zip GRAMERCY, LA 70052 **Fax** _____

E-mail _____

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☒

Comments: The understanding I got from the meeting is that you all are doing a study and the study will end in 2014. After the study then what? How long will it be before it is approved? After it is approved how long will it be before you start building a levee? We need to know how long will it be before we get protection. Six months out of the year we will have to worry.

Thanks

Name Marcelle W Nelson **Affiliation** _____

Street 2517 Williamsburg Dr **Phone** (985) 287-1456

City, St Zip LaPlace, LA. 70068 **Fax** _____

E-mail mw.wallace@yahoo.com

PC_9-10-2013_11_Marcelle W Nelson

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☒

Comments: Alignment D only! Congress will send Billions of OUR money to foreign countries for AID - CHARITY Begins at home! Protect the Wetlands from Salt Water intrusion, Protect I-10 and protect the people of St. James & Ascension Parishes the cost is Less than 1 Presidential Vacation and would cover maintenance for 50 years - - JUST DO IT

Name Frank Fagut **Affiliation**

Street 101 Carrollwood **Phone** 985.652 6085

City, St Zip Vacherie La 70090 **Fax** 985652 8022

E-mail fcfagg@yahoo.com

PC_9-10-2013_12_Frank Fagut

PC_9-10-2013_13_Diane Smith

PCC-09-26-13-009

PC_9-10-2013_13_Diane Smith

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☐ NA

Comments: Please implement Project D. It is not fair to dump/drain the water from the other parishes into St. James. It is not wise either.
The sugar cane, perique and other farmers deserve levees too.
When the plants are forced to close due to high water families are imperiled.

Name Diana Smith **Affiliation** ? citizen
Street 2294 Cypress St. **Phone** 504 6388766
City, St Zip Ill Lutcher LA 70071 **Fax** 225 869 1985
E-mail [illegible]

PC_9-10-2013_16_Stuart G Schultz MD

PC_9-10-2013_16_Stuart G Schultz MD

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☒

Comments: I did not speak at the meeting on 17 Sept 2013 but I am speaking for myself OB Gyn Physician who often has to stay + take care of patients who don't evacuate. For option D

Name STUART G. SCHULTZ MD **Affiliation** Rue de Sante Womens Center
Street 99 Holly Dr **Phone** 985-652-2441
City, St Zip LAPLACE LA 70068 **Fax** 985-652-4167
E-mail STUART.SCHULTZ@ME.COM

Yes Taxpayer + Big time tax payer

PC_9-10-2013_17_Donna Maurin

PC_9-10-2013_17_Donna Maurin

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☒

Comments: Alternative D seems to be the best choice in my opinion.

Name Donna Maurin **Affiliation** Rue De Sante Womens Center
Street 204 West 4th **Phone** 985-652-2441
City, St Zip Reserve, LA 70084 **Fax**
E-mail MSwings1@comcast.net

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? Yes ☐ No ☑

Comments: THE DIVERSION CANAL & SORRENTO PUMPS BOTH DISCHARGE INTO BLIND RIVER. THIS IS A MAJOR SOURCE OF OUR BACKWATER ISSUES. WERE IMPACT STUDIES DONE FOR THESE PROJECTS AND IF SO WHO APPROVED THEM?

FROM WHAT I AM SEEING THE ONLY WAY THAT ST. JAMES PARISH CAN FIX THIS IS LEGALLY. A CLASS ACTION LAW-SUIT MAY BE OUR ONLY ALTERNATIVE.

Name LOWELL ROUSSEL **Affiliation** RESIDENT OF ST. JAMES
Street 2499 HWY. 3125 **Phone** 225 206 4443
City, St Zip PAULINA LA. 70763 **Fax**
E-mail lroussel@r-t-i.com

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☑

Comments: I have been living here for seventy-eight years and have never seen water come up this high in St James Parish (eastbank) for any storms. Very important to go with Alignment D. Please note eagles do not live on the ground, they live in tall trees. Need to rebuild the marsh and barrier island to stop the storm surge.

Name Willie Vicknair **Affiliation**

Street 2192 Jefferson Hwy **Phone** (225) 869-5650

City, St Zip Lutcher, LA 70071 **Fax**

E-mail

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☒

Comments: I am for PLAN D – If we are not given a levee as St John and Ascension Parishes, it will create a funel effect for St. James Parish. The waters that would have normally gone to St John and the waters pumping from Ascension will be displaced to St James Parish. All this water will flood the entire parish not just 1500 homes. Industry, crops and lives will be damaged. Economic impact will be great and cause many not to recover. Please BE fair will all the citizens and make PLAN D the PLAN picked.

Name KERRY D. MELANCON **Affiliation** _____

Street P.O. Box 598 / 1187 DESOTO DR. **Phone** 225-869-4644

City, St Zip Lutcher, LA. 70071 **Fax** _____

E-mail kmelancon@yahoo.com

PC_9-10-2013_2_Kerry D Melancon

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☐

Comments: Please consider Alignment D levee through St. James Parish as we need to protect our homes and our families. Without this Alignment, St. James Parish will not survive the flood waters. Please do the right alignment for all concerned.

Name Don + Irene Melancon **Affiliation** St. James Parish Residents (our entire lives)
Street PO Box 63 **Phone** (225) 869-8441
City, St Zip Lutcher, LA 70071 **Fax**
E-mail irenem@sjstevedore.com

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☑

Comments: PLEASE GO WITH ALIGNMENT "D" TO PROTECT ST. JAMES PARISH, OUR PARISH IS HOLDING FLOOD WATER MUCH LONGER NOW EVER SINCE ASCENSION PARISH PUT IN THEIR PUMPING STATIONS. ALIGNMENT "C" WOULD MAKE THIS PROBLEM WORSE.

Name TERRY BRIGNAC **Affiliation** NONE

Street 1891 THIRD STREET **Phone** (225) 869-3631

City, St Zip LUTCHER, LA. 70071 **Fax** N/A

E-mail N/A

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☐

Comments: I am living at my address for 49 years. When I purchased this land the former owner saw water on this land 1 time in 50 years. Since my ownership I have seen water many times and getting worse at each event. As neighbouring parishes build levees to [illegible] flood water on them, this increases our flood problem. To save my home from flood water, I had to construct a perimeter levee. I have increased levee height 3 times as flooding gets progressively worse. [illegible] threatened to breach my 3 foot high levee such that we had to sandbag 3 cords high, pumping out leakage for duration. Since Isaac I have elevated again to about 4' high. Alignment C unacceptable, we need Alignment D.

Name LAWRENCE MICHEL **Affiliation**

Street 32927 LA 642 NORTH **Phone** 1-225-869-3711

City, St Zip PAULINA, LA. 70763 **Fax**

E-mail

We need long term flood protection, not just a right now fix!

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Vote "D"

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☐

Comments: I watched numerous people asking the Corp. for the only option that doesn't flood St. James Parish. Option "D". Col. Hanson and crew didn't have much to say. It is sad that we are ready to go to war in Syria and don't know what is going on. We would intentionally flood and destroy a parish because of the dollars. No other choice - except for "D"

Name David Michel **Affiliation**

Street 39560 Gravois St **Phone** 225-869-5233

City, St Zip Paulina LA 70763 **Fax**

E-mail Nita39560@yahoo.com

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☑

Comments: I am all for project D it just makes more sense that one would spend a little extra now so we will all be safe from flood water. We work hard for our homes and a little protection could save all of us. Project "D"

Name Jeannine Z. Chauvin **Affiliation** _____

Street 3412 S. Angelle **Phone** 225-206-7201

City, St Zip Paulina, LA 70763 **Fax** _____

E-mail jeannineZChauvin70763@yahoo.com

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? Yes ☐ No ☒

Comments: I am tired of watching the government waste money. I am 68 years old and have paid taxes for many years. Alignment C only protects a few families compared to Alignment D. To do Alignment C and still have to do Alignment D, is stupid. I hope you have more sense than that.

If done right you don't have to raise houses in protected areas, and the wet lands can be saved.

A fifth grader would pick Alignment D

Are you smarter than a fifth grader?

Name Ray E. Hall **Affiliation**

Street 2621 S. Remy Robert Ave **Phone** (225) 644-7284

City, St Zip Gonzales, La 70737 **Fax**

E-mail rayehall@eatel.net

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☐

Comments: Please chose alignment D. with that choice it will save a lot of people, houses and animals. Most importantly it will also give the residents ~~and~~ of St. James Parish + the following parishes that need to evacuate if necessary. Last year roads had water. I-10, Airline Hwy, Hwy 61 and 3125. Houses were flooding + it was hard for the residents to get the help they needed. My parents live on Hwy 61 before I was born. I'm 47 and they never flooded until last year!!

Name Andrea Vitrano **Affiliation** _____

Street 614 North Ezidore Ave **Phone** 225-869-8994

City, St Zip Gramercy, LA 70052 **Fax** _____

E-mail andrea.vitrano@yahoo.com

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☑

Comments: Although the plans proposed do seem effective in increasing security of the parishes of St. James and St. John. It would seem more sensible to build levees to just encompasse the high land of both parishes. It would be cheaper and easier to build levees on solid ground rather than through the swamps as proposed. This would shorten the levees. shorten the construction time of the project. Decrease overall cost. Minimize wetlands interference. Minimize Pipeline crossings. Minimize future Maintenance costs. It just makes more sense

Name Michael P. Guidry **Affiliation** St. James Parish Resident
Street 32260 LA Hwy 642 North **Phone** 225-569-4336
City, St Zip Paulina LA, 70763 **Fax**
E-mail frenko_harris@hotmail.com

PC_9-10-2013_28_Henry T Graham Jr

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☒ **No** ☐

Comments: Please incorporate my verbal comments from the meeting into the record for this issue. Alternative D will provide a greater level of protection to the citizens and industries in Ascension and St James Parishes. The additional cost will be outweighed by the benefits to those Parishes. Please examine the additional benefits derived from Alternative D, including the protection of critical infrastructure (highways, pipelines, docks, railroads and petrochemical facilities).

Name Henry T. Graham Jr. **Affiliation** La. Chemical Association
Street One American Place, Suite 2040 **Phone** (225) 376-7642
City, St Zip Baton Rouge, La. 70825 **Fax** (225) 343-1007
E-mail henry@lca.org

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☐

Comments: (1) If the Pontchartrain Levee District will implement Alternative D if the Corps doesn't, why not work with them to coordinate plans?
2) Can't run plants if can't get to work without I-10 / I-61.
3) Short-term thinking on implementing ALT-C.
4) Overall implementation on Levee system over years appears to look at immediate political and small budgets rather than larger region impacts.

Name Stephen Myers **Affiliation** HOMEOWNER
Street 10621 Hwy 431 **Phone**
City, St Zip ST AMANT LA 70774 **Fax**
E-mail STEPHENCMYERS@HOTMAIL.COM

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☐

Comments: Col. HANSEN You stated the Commander IN Chief told you Not to let WHAT happened IN St John happen again. I feel if you Don't elect Alignment D he will be back and tell You not to let this happen again IN St JAMES It only makes Sense to extend 10 more Miles And protect Every Body. Also protect Hwy 61 And I10 I URGE you to select Alignment D.

Name MICHAEL LOWRY **Affiliation** Home owner
Street 12105 PINE **Phone** 225 869 4717
City, St Zip GRAMERCY, LA. **Fax**
E-mail LAWRYM AT BELLSOUTH.NET

PC_9-10-2013_30_Mildred A Blalock

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card I support ALIGN. "D"
I oppose ALIGN. "C"

Would you like to speak tonight? Yes ☐ No ☒

Comments: I believe ALIGN "D" would benefit a larger area and, in the long run would save tax payer time + money. ALIGN. "C" would be an enormus cost to the public + would protect only a small area. Those affected would be forced to raise their homes or be bought out. this in itself would create hardships, + a change in their way of life. It is difficult to understan why ALIGN. "C" is even being considered. It is a short term fix for only a few. ALIGN "D", o the other hand, would protect a larger + more populated area. Why not do this project right from the beginning? Spend tax payers' money wisely; use the money allocated for the levy plus any monies appropriated to Buy/Raise houses + fund ALIGN. "D". I truly hope you will consider all of the ramifications of this newly proposed Levy system + vote for ALIGN. "D".

stem ↑

Name MILDRED A. BLALOCK **Affiliation** _____

Street 40369 LOOSEMORE RD. **Phone** 225/644-8604

City, St Zip GONZALES, LA. 70737 **Fax** _____

E-mail _____

I believe ALIGN. "D" would be a more effective solution for everyone involved.

PC_9-10-2013_31_Gail Roussel

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☒

Comments: It seems to me that the New Orleans area down to St John Parish will be spared. It seems that Baton Rouge area down to Ascension parish is covered. So where does that leave St. James Parish- we don't matter to the Government- We will again get water from both of our Neighboring Parishes- Is it fair to the residents of St. James Parishes? HELL NO! We need protection also.

Name Gail Roussel **Affiliation** Resident

Street PO Box 844 **Phone** 225-869-8667

City, St Zip Gramercy LA 70052 **Fax** _____

E-mail _____

PC_9-10-2013_32_Sherryl Myers

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? Yes ☐ No ☒

Comments: I am asking that you please ~~decide to~~ implement Alternative D Levee plan. I have lived in Ascension Parish 62 years, I saw higher water levels after the last hurricane than I have ever ~~can~~ in my area, I attribute this to backup water caused by building levees around New Orleans higher.

Name Sherryl Myers **Affiliation** Ascension Parish Resident

Street 10621 Hwy 431 **Phone** (225) 675-8723

City, St Zip St. Amant, La 70774 **Fax**

E-mail sherryl/myers@hotmail.com

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☒

Comments: Unless Plan D is chosen, we are put in a position of receiving water from Baton Rouge & Livingston due to Diversion Canal, from Lake Pontchartrain, due to levees & pump in Orleans, Jefferson, St Charles, St John, & Ascension Parish. How is it reasonable for us to have some of the highest elevations & now we are flooding because of everyone else's water.

Plan D would also reduce to effects of salt water intrusion which harm the wetlands, which is one of your concerns. Please also consider the negative ~~economic~~ effects of Plan C to farming, & industrial economics.

Name Derald Bourgeois **Affiliation** Resident

Street 1859 Logan Ct **Phone** 225-869-5364

City, St Zip Lutcher LA 70071 **Fax**

E-mail derald@ebwins.com

PC_9-10-2013_4_Derald Bourgeois

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☒

Comments: I support Alt. D. I moved to the present location on on N. Airline in 1965. We have not had a flooding problem until Sept. 2012. Alt. D is the only solution to this problem.

Name Frank Vitrano **Affiliation**

Street 1374 N. Airlime **Phone** 225-869-3253

City, St Zip Gramercy, La 70052 **Fax**

E-mail vitranof@bellsouth.net

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? Yes ☐ No ☑

Comments: IF ALIGNMENT D IS NOT CHOSEN; I-10, HWY 61, AND HWY 3125 WILL BE SHUTDOWN, LEAVING RIVER ROAD THE ONLY EVACUATION ROUTE. ENTERGY SUBSTATION WILL ~~FOO~~ FLOOD, CAUSING LOST POWER FOR DAYS, IF NOT WEEKS. LOCAL HOSIPTAL COULD BE FLOODED. WE WILL SEE MORE WATER IF ALIGNMENT "C" IS CHOSEN, THEREFORE I CHOOSE ALIGNMENT "D"

Name MICHAEL WEBER **Affiliation** _____

Street 695 N. PINE STREET **Phone** 225-206-4801

City, St Zip GRAMERCY, LA. **Fax** _____

E-mail MJWEBER54@MAC.COM

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? **Yes** ☐ **No** ☐

Comments: IF IT is only 10 million more FOR ALT. D STOPP Sending money TO OTHER COUNTRIES and help The U.S. citizen's. FIRST.

Name Rusty Montz **Affiliation** Resident

Street 317 Jefferson Hwy **Phone** 225-354-6163

City, St Zip GRAMERCY LA 70052 **Fax**

E-mail

Creel, Travis J MVN

Subject: FW: [EXTERNAL] Re: Contact (UNCLASSIFIED)

-----Original Message-----
From: Scott Eustis [mailto:scott@healthygulf.org]
Sent: Wednesday, September 11, 2013 10:26 AM
To: Varisco, Jeffrey J MVN
Subject: [EXTERNAL] Re: Contact (UNCLASSIFIED)

thanks. I will be specifically looking into the impoundments question for coastal swamps. apologies for the long email below, but here's what we are thinking off the top of my head.

I know at least impoundment and de-coupling the flood cycles encourages tallow and lowers fisheries production.

In brackish marshes in Terrebonne parish an MMS study showed it slows accretion and carbon sequestration and causes sinking of the land, even without major pumping, again probably due to the lack of flushing necessary in the estuarine system. That study led to a few mitigation banks being de-authorized.

Not sure about flooded swamps, but these relict swamps don't need more sinking, which puts ever more strain on the pumping system, in a positive feedback loop.

I know that the soils are where most of the action is, so just looking at the plant layer is not enough, and I will look into any CRMS stations in the project area. One would hope there are sediment cores, but that is only a hope.

There is the landscape scale logic, that hurricanes, like it or not, feed the system with sediments re-worked from the coastal sounds. This is the geological basis of Southwest Louisiana, but it's an important process across the Delta as well, and important to consider in the planning of the sediment diversion. Cutting the swamps off from coastal influx of sediment will also cause them to sink because they will not receive mineral sediments important for elevation.

People have to stop pretending salt water is more important than subsidence for Louisiana. Don't people remember there used to be towns in Ruddock, and on the Lake at the spillway? in St Malo? The salt water has come into the system before; the hurricane salt pulse is much less a problem than the everyday salt wedge caused by the MRGOs and ship channels through the barrier sounds.

My intuition from places like Lake Boudreau and Plaquemines Parish, as well as the failed Hammond assimilation site, is that impoundment around pollution sources is a double whammy to the structural plant life. I don't know what the sewerage situation is like in these parishes, but we question impounding wetlands along with sewerage systems, unless the outfalls are pulsed to allow for the natural drawdown periods where the plants can recover. Again, Hammond is a warning sign that flooding wetlands with nutrient rich water can eliminate the wetland if it's done incorrectly.

We can see from New Orleans that the consequences of not thinking about the contradictory nature of levees--protecting, but aggravating subsidence, can cost major money in the long

term --new orleans is looking at $6 B + to stay afloat from its own levee-induced flooding problem.

Having grown up in New Orleans, Lakeview unfortunately, we flooded nearly every year in the 90's. Flooding from rain and induced subsidence from levees is a serious cost.

I heard much complaining about the new pumps in Ascension Parish causing backup in St James; our position has ever been that the spawl development in Baton Rouge outward is endangering these areas, and probably made Isaac worse, and I'm wondering how that plays into this project. I know that is a question for the Colonel, but it's an important question in considering alternatives--how is Ascension parish's decision to do things the old, bad way impacting St James and what is the Parish plan to stop their flooding of St James?

Everything seems to hinge on water models that aren't there; and if we don't have those, we are only operating from principle, and the lines of defense principles should guide the day.

We are truth tellers, but not suicidal, at GRN. I will be the bearer of bad news next time, reminding people of sea level rise and the need to pay for these projects, that levees are not magical water-stopping barriers, and that 100 year risk reduction means a 26% shot at your home flooding over 30 years, and that subsidence is more important than salt water, all things that the state has learned to include, in its way, in its public discussion of these matters.

Cheers,

Scott

On Wed, Sep 11, 2013 at 9:31 AM, Varisco, Jeffrey J MVN <Jeffrey.J.Varisco@usace.army.mil> wrote:

> Classification: UNCLASSIFIED
> Caveats: NONE
>
> Hi Scott,
>
> I forgot to give you my business card last night at the public meeting. My signature has all the pertinent info. If you have any questions or comments on the project, please don't hesitate to contact me.
>
> Sincerely,
>
> Jeff Varisco, PMP
> Project Manager - Projects Branch
> US Army Corps of Engineers - New Orleans District
> 504-862-2853 (office)
> 504-388-9055 (cell)
>
> Classification: UNCLASSIFIED
> Caveats: NONE

--

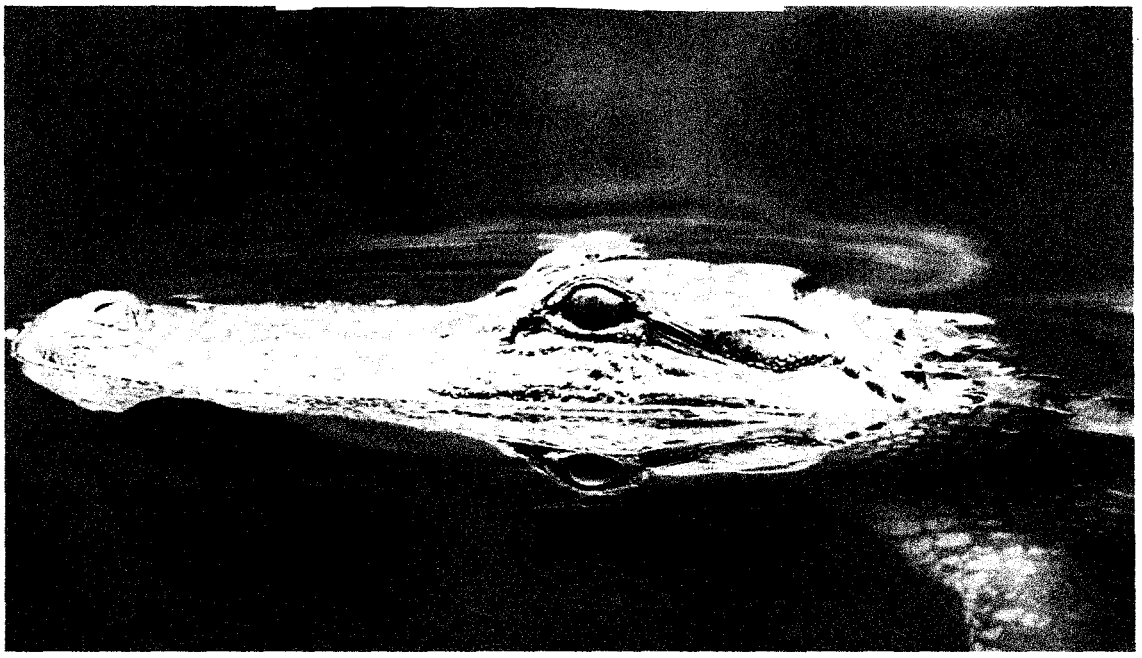
Scott Eustis, M.S.
Coastal Wetland Specialist
Gulf Restoration Network

504 237 0323
504-525-1528 x212
scott@healthygulf.org
www.healthygulf.org <http://www.healthygulf.org/>

541 Julia St, Suite 300
New Orleans, LA, 70130

Classification: UNCLASSIFIED
Caveats: NONE

CAJUN PRIDE SWAMP TOURS



Description of Cajun Pride Swamp Tour:
Located at 110 Frenier Road, LaPlace, Louisiana 70068, 800-467-0758

September 12, 2013

Re: Questions and concerns about the proposed Hurricane Barrier for St. Charles and St. John's Parishes and how it will affect our family's business, Cajun Pride Swamp Tours at 110 Frenier Rd., LaPlace LA 70068

To whom it may concern,

Based on the map that was in the Times-Picayune on August 25th 2013 outlining the proposed levee construction, and the attached map provided to me by the LaPlace Zoning Office, it appears that our property is subject to being bisected by the current proposal. My wife and I own P.B. Bayou Charters dba Cajun Pride Swamp Tours which is located at the intersection of Hwy 51 and Frenier Rd. You can see that the proposed levee (in yellow on attached map) will divide our property (outlined in red). As our business consists entirely of providing public tours by boat through our water ways, and the surrounding water ways, we are greatly concerned that the proposed project will dramatically alter the land, waterways, and atmosphere of what our guest have come to enjoy. The following is a list of questions that we have as to how the proposed project may affect our property, business, and livelihood before, during, and after the construction of the levee.

- What is a true timeline of when the project will start?
- Are public hearings being held and/or scheduled to allow input from landowners likely to be affected by the project?
- Is the project, in fact, going to necessitate the use of property that we currently own?
- Can the proposed levee or wall be construction 1 mile closer towards Lake Pontchartrain or along the existing rail road line?
- When, and in what manner, will I be notified as to any planned or proposed use of my property?
- When, and in what manner, will I be notified that any portion of my land will be subject to condemnation?
- What is the timeline on when construction may directly affect my property?
- How long may the project last on our site?
- How wide and tall is the wall going to be through my property?
- Has an Environmental Impact Study been done on how the levee will affect the wetlands and animals in our area and on my land?
- How much materials, equipment, and crew will be placed at our site?
- How much of my land will need to be cleared to make way for the levee or wall?
- Will any of our Cypress trees be cut down or removed from my property?
- Will a wall or levee be placed through our property?
- How will the Corp get the materials to the work site?
- Will the Corp be using my land or water ways during construction?

- Will flood gates be used on all waterways that are being affected by the proposed protection?
- Can the proposed project be pushed closer and along HWY 51 with access to Frenier Rd?
- In what manner may I communicate with the Corp of Engineers with regard to their plan and possible ways to minimize the potential damage to our business?
- In what manner will we be compensated if our buildings and grounds must be raised as a result of the project?
- Will my business be able to operate on our site and have access to our waterways and surrounding waterways, as well as maintain its current frontage to the highway, during the construction of the proposed levee or wall?
- In what manner will we be compensated for any loss of business resulting from project?
- In what manner will we be compensated for loss of land, Cypress Trees removed or cleared, and cost to rebuild the marsh and wetlands that are disturbed?
- Will we be compensated for loss of business due to an inability to conduct tours directly caused by the hurricane protection?

I fear that our family business has been given a death sentence and know it is only a matter of time before the unknown will be upon us. On a personal level, this project has a profound effect on the life of my wife and I, as well as our employees. Below are a few ways this is personally impacting us:

- Stress caused by our daily concerns on what the future has for us as this is all out of our control.
- Stress due to potential loss of revenue and the affect it will have on our employees, future wages, future projections, and future growth as a company.
- Potential loss of vendors and clients due to the uncertainty raised by the project as to the sustainability of our business.
- Stress due to the financial commitment and investment into our property with now has an unknown future.
- Stress due to debt to our vendors that is long term as we only bought the company and property 3 years ago.
- Stress of not knowing if we will have a retirement. This company is our retirement.
- Stress of not knowing if our children will have a future based on our company.

I do want to state that we are not against the proposal for the protected project. We are most definitely in favor of the project and the protection it will give the Tri-Parish. We simply want to raise our concerns, obtain answers, and ensure that all due consideration has been given as to how the project will affect us. We are a mom and pop operation with 15 employees. We are not a large company with high cash reserves and financial backing. Our operation is dependent on access to and use of the wetlands and waterways to conduct our tours. We are not able to relocate our business due to the unique services we offer which include the lands and waterways we own. Since 1990, Cajun Pride

Swamp Tours has been in operation at its site on Frenier Rd. We are a great attraction to St John's Parish and proud to be a part of the community. We love what we do, love our employees, and most all, love the land that we own. What we have, and own, is unique to Louisiana and South Louisiana especially. We hope to be a part of the community for a long, long, time and hope to be able to work with the Parish on this project and have our particular issues and concerns considered by the Army Corp of Engineers.

I appreciate your time and efforts and would love to speak to you in person concerning this matter. We would love to take you on a tour or boat ride to show you our property and address the concerns we have first hand. I can be reached at 504-485-1404 (my cell phone) to discuss this matter.

With kind regards from the bayou!

Paul Bair

Paul Bair

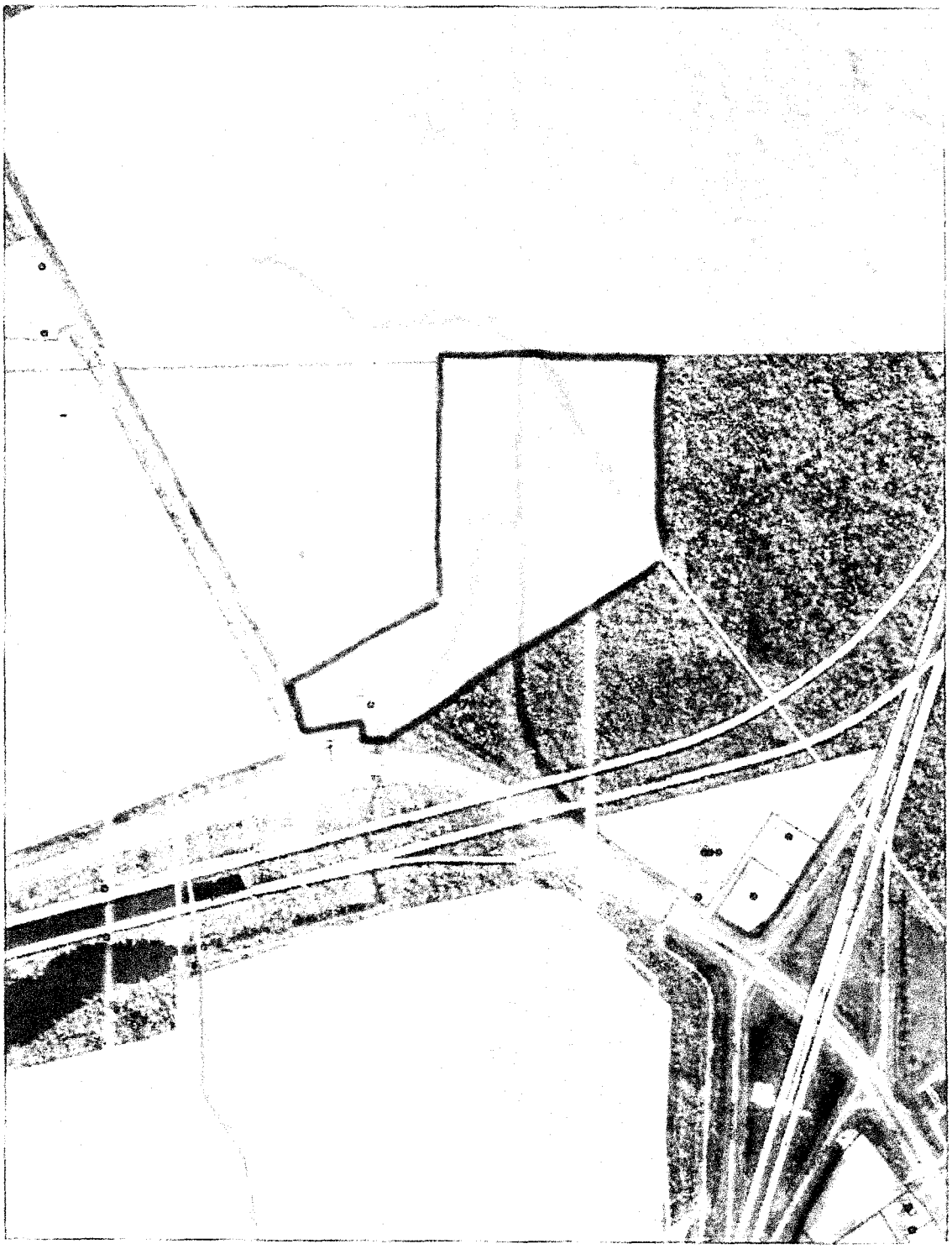
Owner/ manager

Cajun Pride Swamp Tours

110 Frenier Rd.

LaPlace LA 70068

504-467-0758



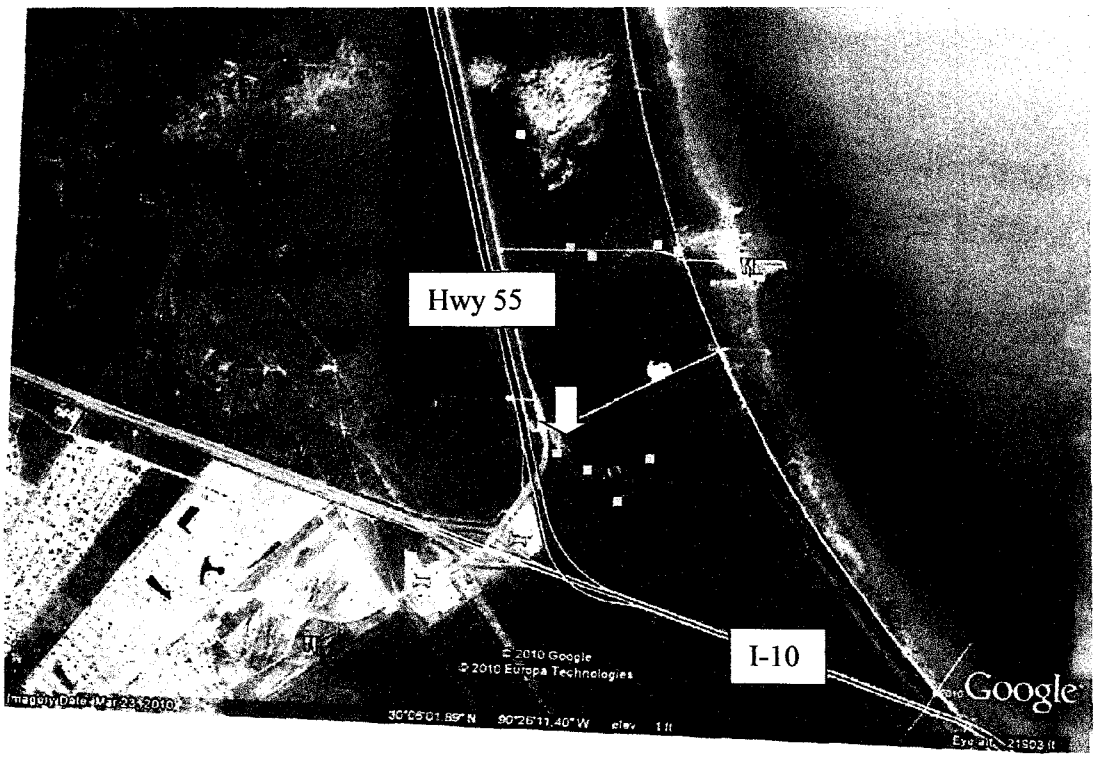
DESCRIPTION OF OPERATION

Cajun Pride Swamp Tours was established at this location in the 1990's to provide swamp tours into the adjacent wetlands and offer an insider look at the untouched and natural beauty of the Manchac Swamp and its inhabitants. Current facilities consist of 3 passenger boats, animal exhibit, ticket office, 8 stall restroom facility, covered and uncovered picnic area, gift shop with over 200 separate items with a swamp and New Orleans flair, and parking for multiple vehicles and or motor coaches. Daily swamp tour operations consist of conducting 1.5 to1.75 hour tours via boat through the waterways, swamps and bayous associated with the private property (55 acres) and wetlands owned and managed by Cajun Pride Swamp Tours. We conduct tours daily at 9:30am, 12:00pm, 2:15pm and 4:15pm with other tour times available upon request. Trips are narrated by USCG licensed captains and tour guides aboard 45-65 passenger custom built tour boats. We cater to local business, New Orleans tourism operators, and wholesalers.

In conjunction with the swamp tour, at times when requested, we can provide catering services for groups. These catered events can be aboard tour boats, or on the premises at the covered picnic area.

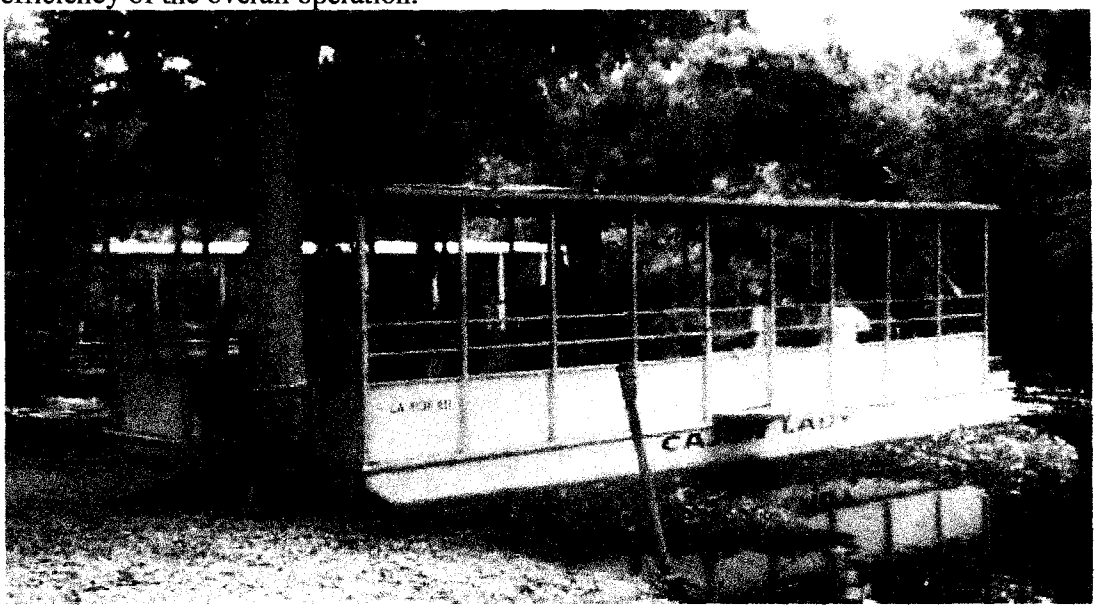
COMPANY LOCATION

Our existing swamp tour business, Cajun Pride Swamp Tours, is located at 110 Frenier Road, LaPlace, Louisiana 70068, near the intersection I-10 and Hwy 51, approximately 27 miles west of New Orleans, Louisiana. The tour related facilities are sited on 55 acres of property inland area adjacent to canals that lead into wetland area. Map provided below depict the vicinity and location of the existing swamp tour facilities and the boundary of the Frenier Road, Interstate 55, and Interstate I-10.



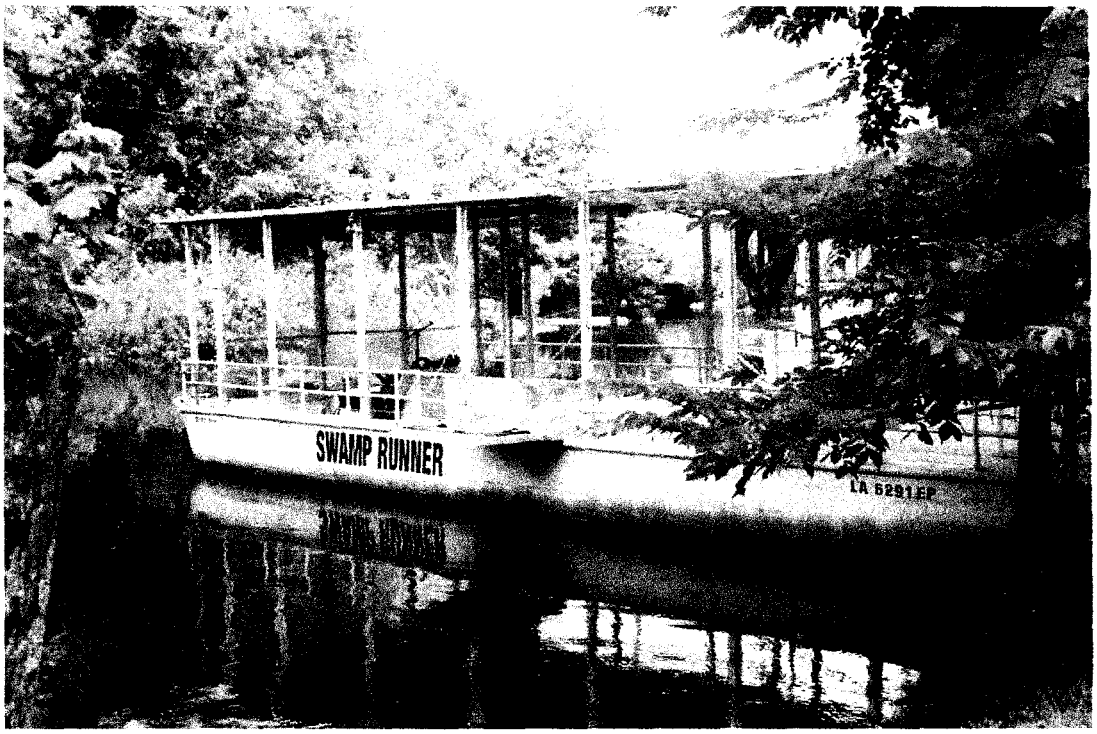
USCG CERTIFIED VESSELS

Cajun Pride Swamp Tours consists of our land facilities as well as 3 passenger vessels docked adjacent to our parking site. Below is a list of the vessels associated with our company's daily operation. These boats were constructed with our operation solely in mind. From the draft of the vessels, type of motors used, routine maintenance of the vessels according to USCG standards, as well as company polices, all aspects of the vessels details have taken into consideration the environment, passengers/guests, and efficiency of the overall operation.

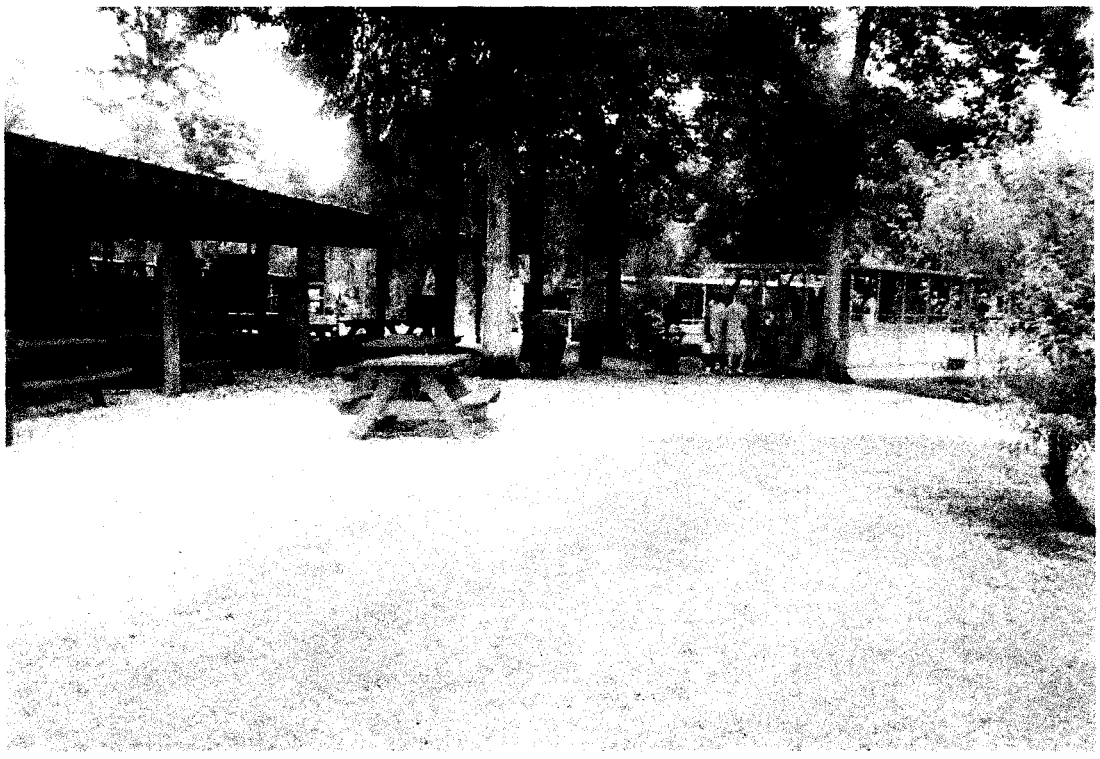


55-64 passenger swamp tour boat.

Our New 55-65 passenger tour boat... will be in services starting Oct of 2013



44-49 passenger swamp tour boat.



Swamp tour ticket office and picnic area.....seating for up to 120 guests

New 6 stall, 400 square foot restroom facility.

September 13, 2013

US Army Corps of Engineers, New Orleans District
c/o Public Affairs
CEMVN-PAO
P. O. Box 60267
New Orleans, LA 70160-0267

Colonel Richard Hansen,

I am a resident in the town of Lutcher, Louisiana. I was born and raised in a group of small towns all located closely together – Lutcher, Gramercy, Paulina and Grand Point. I am deeply fond of St. James Parish and our local heritage that includes festivals, sports and burning bonfires at Christmas time.

I attended the Corps of Engineers meeting on Tuesday, September 10, 2013 in Lutcher. I listened to the Corps, the Louisiana Department of Wildlife and Fisheries, and the resident's viewpoints on Alignment C and D. I would like to express some of my views with you.

After Hurricane Isaac passed through our area, electricity was shut off to the towns of Gramercy and Lutcher for three days because floodwaters endangered the electrical substation just north of US Highway 61. I have never seen the electricity shut off to the substation in all my 54 years. One resident at the meeting talked about the significant turmoil that would be caused if we were to lose all the substations on the east bank of the St. James Parish. How long would it take for floodwaters to recede so that power could be restored to the parish? Another resident brought up that losing the electrical substation forced St. James Parish Hospital to run on generator power for several days. This was the only hospital open and running for several miles. I became an emergency patient at the hospital during this time. Thank goodness they were able to remain open on generator power.

A few residents spoke on the effect of floodwaters on our high industrial area that includes not only St. James Parish but also St. John, St. Charles and Ascension Parishes. My wife and I, both employees in this industrial sector, know how much time and effort employees of these industries put in to keep them operational or start up after these events. With floodwaters affecting Interstate 10, US Highway 61, state and local highways how are people going to get to their jobsite? How are the local industries going to get back in running order? Not to mention the resources needed to start up these industries will have to be trucked into the area which would be difficult when roads are closed.

There is also the issue of our farmers with their rich soil, sugar cane, soybean and tobacco crops. If floodwaters inundate their farmland, that year's crop is destroyed since the peak of hurricane season coincides with fall harvest, not to mention the long-term affect it would have on the soil. Can you image being a farmer all your life and all of a sudden loosing your past, present and future?

There is an old saying in this area "I will give you the shirt off my back if you need it". In the aftermath of Hurricane Katrina, St. James Parish was the last stop for travelers trying to get back to New Orleans. Our parish residents helped people obtain food and gasoline, gave them a place to rest and provided a means for them to communicate with loved ones. Our shirts came off again following Hurricane Isaac by helping our neighbors, family and friends to sandbag their

homes and stand watch on floodwaters in the towns along the banks of the Mississippi River. I wish we knew how many houses were saved and man-hours spent helping neighbors in need following Hurricane Isaac.

I wish I had a crystal ball and could see if future hurricane floodwaters would affect St. James Parish from the Maurapas swamp all the way to the Mississippi River levee. No one can predict the future but at least we can try to prevent disastrous floodwaters in the future by choosing Alignment D.

One thing not mentioned at the meeting, how tragic it would be if we lose one life to floodwaters because we did not have Alignment D. The United States spends a lot of money in foreign aid to other countries. It would be very disappointing to lose an American's life in this country because of a lack of proper flood protection.

Thank you for your time in attending the meeting and hearing the residents voice their opinions on this topic and for reading this letter. I hope you will reconsider the draft proposal and choose Alignment D to provide full protection to St. John, St. James and Ascension parishes.

Sincerely,

Blane Deroche

Blane Deroche

September 17, 2013

To Whom It May Concern,

I am writing in regards to the building of levees to protect St. John Parish from future flooding. My husband Sean Ory and I have two homes here in LaPlace. Our families have lived here for over 40 years. We are asking for levee protection in the event of flooding. We along with our extended family have so many homes here that need protection. We were lucky that only 2 of the homes in our family were flooded during Hurricane Isaac including the one we lived in on Rienzi Drive. We were smart enough to purchase flood insurance after Hurricane Katrina even though we don't live in a flood zone.

We are praying that the levees get built and built in a timely manner. We cannot afford to pay higher flood insurance. Our homeowner's insurance is high enough along with the large house notes. Since we have 2 homes to pay for and worry about we are even more concerned for our family and our property.

We would also like to express that we feel that the levees should extend to protect St. James Parish as the flood water that we will be blocking will go to them. We feel it is only fair and not that more expensive to include their protection.

Respectfully,

Tina and Sean Ory
Properties:
522 Rienzi Drive
LaPlace, La. 70068
And
1108 Madewood Road
LaPlace, La. 70068

Public Comment from 17 Sept. meeting in Laplace

ST. JOHN THE BAPTIST PARISH ★ LOUISIANA ★

ST. JOHN The Baptist Parish

Felicie "Phyl" Cornman
Exec. Secretary/CRS Coordinator

102 E. Airline Hwy.
LaPlace, Louisiana 70068
Office (985) 651-5565
Direct Line (985) 359-0238
FAX (985) 653-9808
f.cornman@sjbparish.com

PC_9-17-2013_2_Andrea and Adrien Delbasty

September 17, 13

US Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

'he «Last» Family Home

›ost Isaac floodwaters

:2366 Dr.
'aulina, La.70763

:25-937-4873

To whom I need to convince, ALTERNATIVE D is the only option:

I was born a St. James Parish resident and I would like to stay a St. James Parish resident. My husband and I, along with our two sons, live in Paulina on 3 acres of land since 1985. We live in a beautiful Acadian style home that we built with our own hands from the ground up. We built 11 feet above sea level as an escape the hazards of living in the dangerous fish bowl of New Orleans.

I am writing to convince you that the tentatively selected plan of Alternative C is the wrong plan.

I must start with the card you sent allowing us to make comments. I feel as though you are all focused on the project and its environmental **impacts.** The Federal Government budget seems to be more important than the people of St. James Parish. Your focus seems to be "environmental **impacts.**

"What about the **human impacts**?"

I have worked in Baton Rouge for 25 years, but I will always call St. James Parish home. I would never consider living anywhere else but St. James Parish. I was born and raised here, and my extended family lives here. My sister is my neighbor and my husband's sister lives down the street. We have a family network to consistently depend on. We live in a safe neighborhood with a one of kind support system.

I feel as though **your data you provided for your decision making is incomplete.**

You will never find a more supportive and cohesive community. People in the city don't understand what we have here until they experience it firsthand. When others are in need, we all prevail to assist. During this last flood from the backwash days after Hurricane Isaac, this cohesive community protected it's residents and their homes. They all went over and beyond their call of duty as my home and many homes were threatened by mammoth amounts of back flowing water. People from this community were on their hands and knees working in all aspects to keep steadily rising back water out of our homes. From transporting farm animals to higher ground, to lifting furniture and appliances, to filling and hauling sands where needed, everyone who was available worked around the clock. From children to elderly, everyone had a common goal to provide safety and security to their families and their neighbors. The choice to try to save their home and possessions was made over the choice to abandon their homes and let the federal government pick up the bill. In the end, less insurance claims were filed due to prevention of flooding. My husband and I had to pay nearly **$20,000** out of pocket to repair damage that was not covered by insurance. My husband and I are still in the process of repairing humidity damaged to the floors in our home. We built above the ground and the home was safe from the flood waters, but the prolonged humidity from the retention water cause buckling of all of the wood under the house and hence the flooring in the interior was damaged. Sometimes I feel as though my husband and I were punished for our efforts to keep our home and our community safe.

The economic **impact** needs to also be further investigated. What will the President and America do without the Refineries? If you allow our community to flood, 75% of the parish

works in a refinery. How will they get to work if the area is flooded and how will the employees protect their homes and families? How will these men and woman get these plants up and running if their homes are flooding, their roadways are under water, and their children are unattended because schools are under water? The economic **impact** of Plan C is critical.

Plan D is obviously a better option in providing America and St. James Parish Economic Security.

I am a registered nurse that worked 12 hours shifts for weeks trying to save all of the premature babies in intensive care units from New Orleans during Katrina and again from Lafayette during Rita. I saw more devastating effects from flood waters in one month than I could have dreamed of in a lifetime. Parents were separated from their children because of flood waters. I do not ever want to think that I could be a statistic from flooding. I don't want to ever think that I am putting my life and the lives of my children at risk due to flooding.

You must protect us in St. James Parish with a levee as stated in option D. We deserve to be protected.

Where is "We the People of the United States of America?"

I feel like the Federal Government is more interested in preventing spending and protecting the environment than it is in protecting the American citizens of St. James Parish.

Who cares about a school of fish dying when a school of children will be affected by flood waters!

Who cares about salt water creeping and its effects on the environment when an American family who did the right things in protecting their home and their community gets flooded!

Who cares about the cost of Plan C being less expensive than Plan D when and entire community of American Citizens is wiped off the map from poor choices!

You should care.

You should not choose any other option than to provide St. James Parish with the safety and security they deserve as hard working American citizens.

Option D is the only option for protecting "We the People of St. James Parish!"

With great hope that you will consider Option D,

Andrea & Adrien Delbasty

andrea.delbasty@womans.org

MVD

Date: 09/17/2013

Name: SHEFFARD DEROCHE, JR.
Address: P.O BOX 297, LUTCHER, LA 70071-0297

To: U.S. ARMY CORPS OF ENGINEERS
Address: 441 G STREET NW, WASHINGTON, DC 20314-1000

Dear: MADAM OR SIR,

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.

Sincerely,

Sheffard DeRoche, Jr.

Date: September 18, 2013

Name: Elaine L. St Pierre
Address: 1650 Second St.
Lutcher, LA 70071

US Army Corps of Engineers, New Orleans District
c/o Public Affairs
CEMVN-PAO
P.O. Box 60267
New Orleans, LA 70160-0267

Dear US Army Corps of Engineers:

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.

Sincerely,

Elaine L. St Pierre

Date: September 18, 2013

Name: Aubrey A. St. Pierre

Address: 1650 Second St.
Luling, LA 70070

US Army Corps of Engineers, New Orleans District
c/o Public Affairs
CEMVN-PAO
P.O. Box 60267
New Orleans, LA 70160-0267

Dear US Army Corps of Engineers:

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.

Sincerely,

Aubrey St. Pierre

Bonnie L Poche'
3271 LA Hwy 642
Paulina, LA 70763-2406
(225) 869-4783

September 19, 2013

US Army Corps of Engineers, New Orleans District
C/O William Klein
PDN-CEP
PO Box 60267
New Orleans, LA 70160-0267

Mr. William Klein:

As a concerned citizen of St. James Parish, I have reviewed the West Lake Shore Ponchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the US Army Corps of Engineers to evaluate different alignment options.

I am requesting that the US Corps of Engineers re-evaluate its tentative decision of Alignment C and promote the only Alignment (ALIGNMENT D) that will also provide hurricane levee protection to the residents, industries and highways of St. James Parish.

ALIGNMENT D is essential in insuring the safety of families, properties, business and industry. It is also of utmost importance to provide a SAFE HURRICANE EVACUATION ROUTE for lower lying and southern areas of Louisiana, which runs through St. James Parish. Without the protection of ALIGNMENT D, Interstate 10 and US Hwy 61 WILL flood in the event of a hurricane or tropical storm, if Alignment C is chosen. The water simply has no where else to go.

May you be reminded that the Industry of St. James Parish being shut down due to flooding will greatly affect the United States as a whole.

We, as tax paying citizens of St. James Parish also deserve the protection offered to our neighboring parishes.

Thank you for your consideration of this very important matter.

Sincerely,

Bonnie L. Poche'

Bonnie L Poche'

This meeting was a joke and a slap in the face for the residence of St. James Parish. It was a shut us up meeting. It takes no high price educated engineer and a many million dollar study to figure out when you build levies around the low ling areas like New Orleans, St. Charles, and St. John parishes someone else becomes the low ling area. This is surly about the number of votes for the usual corrupt politicians. I guess St. Tammany will get levies next you think you can run but you can't hide. You may get away with it in this life but in the next life you will answer to what you did and also what you did not do.

Name: Edward Guidry Affiliation: Home owner which has never flooded for in a 100 years

Street: 1206 Marquette Dr.

Lutcher La. 70071 Phone: 225-806-5116

guidrye@bellsouth.net

The meeting tonight will provide venues for community members to learn more about the integrated feasibility report and EIS, the draft tentatively selected plan and to provide comments regarding the project and its projected environmental impacts.

Speaker Request/Comment Card

Would you like to speak tonight? Yes ☐ **No** ☑

Comments: _____

SEE ATTMENT

Name _____ **Affiliation** _____

Street _____ **Phone** _____

City, St Zip _____ **Fax** _____

E-mail _____

September 26, 2013

To Whom It May Concern:

I have been a resident of St. James parish my entire life. As a wife, mother and grandmother, I am writing to express my concern about the levee protection system. After attending the meeting at Lutcher High School on September 10, 2013, I understand the corp of engineers have tentatively chosen plan C but what I don't understand is how or why. It seems very obvious that if they proceed with the tentatively chosen plan C, they are creating a flood zone for St. James Parish.

It was said in your meeting on September 10, 2013 that after hurricane Isaac, President Obama told the corp of engineers to do something so this does not happen again but did he tell them to proceed with a plan that will endanger another community? Being a resident of this parish for over 60 years, I never seen water like we had after Isaac. The water that was not a result of the storm, rather it was a result of the flooding in St. John Parish and the pumps being used in Ascension parish. This left St. James Parish the target spot.

I'm sure you have heard many stories but here's mine. My daughter and son-in-law have two small children and live on Ricky lane in Paulina. My husband and I stayed with them for hurricane Isaac. Isaac hit land Tuesday evening and lasted through most the night. Wednesday we headed home to access our damage. When we returned to my daughter's house Thursday morning we noticed high water in the ditches nearby and by Thursday evening the water was overflowing the ditches covering part of the road. On Friday we were no longer able to get to my daughter's house as the water was too high. At this point, the water was continuing to rise and they were at risk of flooding. I met my daughter on Hwy 3125 where she brought me her two kids (ages 7 & 2) on a 4 wheeler. I watched as they treaded through water that just about covered the tires of the 4 wheeler. I also observed their neighbor bringing his kids to the Hwy in a pirogue boat. I went to the local fire dept and requested they bring loads of sand to the front of the Hwy 3125 where the community pulled together and began sandbagging. This went on for endless hours. This was very emotional for me as there was nothing more I could do to help them save their beautiful home they worked so hard for. The point I am trying to get across is that St. James Parish needs protection. We need a levee system just like St. John Parish does. If Ascension parish has pumps and St. John parish has levees, where does that leave St. James Parish? What kind of protection do we have?

It is my opinion and the opinion of many others that plan D should be chosen. We are strongly requesting you reconsider and choose plan D. This is the most logical plan that provides protection to all of the parishes.

Sincerely,
Sheila Roussel

Date: 9-29-13

Name: Brendon Ruiz

Address: 3402 Riley St.

Paulina La. 70763

US Army Corps of Engineers, New Orleans District
c/o Public Affairs
CEMVN-PAO
P.O. Box 60267
New Orleans, LA 70160-0267

Dear US Army Corps of Engineers:

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.

Sincerely,

Brendon Ruiz

Date: September 27 2013

Name: Joel Borne

Address: 2858 Garden Lakes
Paulina LA 70763

US Army Corps of Engineers, New Orleans District
c/o Public Affairs
CEMVN-PAO
P.O. Box 60267
New Orleans, LA 70160-0267

Dear US Army Corps of Engineers:

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.

Sincerely,

Joel Borne

Date: 9/30/13

Name: Jessica Ruiz

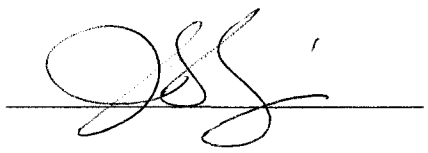
Address: 3402 Riley St.
Paulina, LA 70763

US Army Corps of Engineers, New Orleans District
c/o Public Affairs
CEMVN-PAO
P.O. Box 60267
New Orleans, LA 70160-0267

Dear US Army Corps of Engineers:

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.

Sincerely,



Date: 9/7/2013

Name: Melody Deroche
Address: 1332 N. Airline Ave
Gramercy, La 70052

To: U.S. Army Engineer District, New Orleans
Address: 7400 Leake Avenue
New Orleans, La 70118

Dear: Sir,

As a concerned citizen of St. James Parish, I have reviewed the West Shore Lake Pontchartrain Louisiana Hurricane and Storm Damage Reduction Study used by the U.S. Army Corps of Engineers to evaluate the different alignment options. Although Alignment C is tentatively chosen, I am requesting your assistance to promote the option of Alignment D. According to the graph released by the U.S. Army Corps of Engineers, Alignment D is the only option that will provide levee hurricane protection to St. James Parish. The overturn of this decision is important in order to insure the safety of families, properties and/or businesses during the event of a hurricane or tropical storm. It is crucial that members of our community as well as our congressional and state representatives and local officials join to work towards the goal of keeping the river region safe. Any assistance or guidance you can provide will be greatly appreciated. Thank you for your consideration of this very important matter.

Sincerely,

Melody Deroche

CONGRESSIONAL CONTROL RECORD

DATE REC'D: October 3, 2013

SUBJECT NAME: Lake Pontchartrain Westshore Hurricane Protection Levee

SUSPENSE DATE: October 11, 2013 **NO: 13-047**

DATE (Letter)**: October 2, 2013** TYPE: LTR

FROM: John A. "Johnny" Berthelot
State Representative of Louisiana
District-88

FILE DESIG: **Congressional**

SUMMARY – State Rep Berthelot's letter has questions/comments regarding the Lake Pontchartrain Westshore Hurricane Protection Levee, RE: Ascension, St. James Parishes

TO: PAR (Wingate/Varisco) DATE: 3 October 2013

COMPLETED:

TO: _____ DATE: _____

LOUISIANA HOUSE OF REPRESENTATIVES

3-047

1024 S. Purpera
Gonzales, LA 70737
Email: berthelotj@legis.la.gov
Phone: 225.647.5646
225.644.7240
Fax: 225.644.7207

Appropriations
Joint Legislative Committee
on the Budget
House and Governmental Affairs
Municipal, Parochial and
Cultural Affairs

JOHN A. "JOHNNY" BERTHELOT
State Representative ~ District 88

October 02, 2013

To whom it may concern:

Please see the brief list of questions/comments Regarding the Lake Pontchartrain Westshore Hurricane Protection Levee:

1. Is Ascension Parish included in the Federal Authorization? If so, what is the name of the bill? If not, do they need to be included, and how will being included affect the choice of alignments?

2. Is it true that for Alignment D that the costs of constructing the levee are counted, but not the benefits?

3. Is it true that for Alignment D that there are no benefits calculated for the protection that would be provided to I10? If not, why?

4. What is the true risk of flooding for Ascension and St. James Parish with no project? How many structures will flood? To what level? Where?

5. What are the adverse impacts to Ascension and St. James with Alignment C? How many structures will flood? To what level? Where?

6. Is it true that that the construction cost difference between Alignment C ($880M) and Alignment D ($890M) is only $10 M? It seems that there would be several LARGE structures that would be required to be constructed (Blind River Crossing and Bayou Conway Crossing) for Align D, so how is it that there is only $10M cost difference?

7. The environmental impacts are substantial for any alignment, but the environment is already significantly impacted by the footprint and restriction of natural water movement by I-10. How can a levee that parallels I10 have that much worse of an impact?

8. Is there to be a structure buy-out and elevation program in St. James and Ascension? How is it determined which structures/areas will be elevated and which will be bought-out? Has the location and number of structures been determined?

Best Regards,

John A. Berthelot

John A. "Johnny" Berthelot
Louisiana House of Representatives
District 88

Received By
CEMVN-EX
US Army Corps of Engineers
New Orleans District

OCT 3 2013

SD_9-17-2013_4_Gregory A Miller

CONGRESSIONAL CONTROL RECORD

DATE REC'D: September 19, 2013

SUBJECT NAME: West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Feasibility Study

SUSPENSE DATE: September 30, 2013 **NO: 13-044**

DATE (Letter)**: September 17, 2013** TYPE: LTR

FROM: Gregory A. Miller
State Representative of Louisiana
District-56

FILE DESIG: **Congressional**

SUMMARY – State Rep Miller recommends the Alternative D plan for West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Feasibility Study

TO: PAR (Wingate) DATE: 19 September 2013

COMPLETED:

TO: _____ DATE: _____

13-044

LOUISIANA HOUSE OF REPRESENTATIVES

9 Apple Street
P.O. Box 190
Norco, LA 70079
millerg@legis.la.gov
Phone: 985-764-9991
Fax: 985-764-9993

Civil Law and Procedure
Judiciary
House and Governmental Affairs

GREGORY A. MILLER
State Representative ~ District 56

September 17, 2013

Colonel Richard Hansen, Commander
New Orleans District
U.S. Army Corps of Engineers
P. O. Box 60267
New Orleans, LA 70160-0267

RE: West Shore Lake Pontchartrain Hurricane
and Storm Damage Risk Reduction Feasibility Study

Dear Colonel Hansen,

I am thankful to you and your staff that forty (40) years after Congress enacted legislation requesting the opportunity to review a Chief's report we finally have an Integrated Draft Feasibility Report and Environmental Impact Statement and which is a vital step in getting hurricane protection for this area. We know and appreciate the hard work that went into this draft report. We appreciate the Corps calling this public meeting to give the people in our communities the opportunity to address their concerns.

Chief among our concerns with the Tentatively Selected Plan (TSP) of Alternative C is that it would not provide adequate protection to all of the communities in the study area, as well as significant parts of Ascension Parish. I am asking that the Corps of Engineers recommend Alternative D, which at a cost of only $10 million more, would address these concerns.

The entire region needs to be protected because of the vital role in the economic security our Country provided by our petrochemical industry, the Port of South Louisiana, U.S. Highway 61 (Airline Highway), Interstate 10, and, most importantly, the people who live in our communities.

Alternative C would leave vulnerable vital routes that are essential for all of the south shore of Lake Pontchartrain and the River Region, including New Orleans, for evacuations, recovery, and supplying our businesses to keep industry operating and our citizens working. The only major highways leading west out of New Orleans would be left unprotected by this plan.

While the people of this area are mindful of environmental concerns, the hardwood swamps have protected the people of this community and served as a buffer from storm surge since our relatives first settled the German Coast almost three hundred years ago, and without any levees, these swamps, and the protection they provide, are disappearing. The best way to preserve these hardwood swamps is to encapsulate these wetlands which will protect them from further degradation as a result of saltwater intrusion.

Among many things that the draft report failed to consider in recommending Alternative C are:

1. Post-2007 events such as the flooding from Hurricane Isaac in 2012;

2. The post-construction effects of an Alternative C alignment on our communities outside of the protected area; and

3. The resulting increased costs of non-structural measures in those communities outside the protected area.

I fully support the locally preferred Alignment D alternative contained in the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study. This alignment would be in the best interest of Ascension Parish, St. James Parish, St. John the Baptist Parish and St. Charles Parish, and the entire region, including New Orleans.

Please strongly consider recommending Alternative D. Our communities want the comprehensive protection and that Alternative D will provide and they have agreed to bear any increased costs of maintaining this alignment. The benefits of having the protection provided by Alternative D will ultimately prove to outweigh any possible increased costs.

Any favorable consideration and support of Alternative D that the U.S. Army Corps of Engineers can give would be greatly appreciated.

Thanking you, I remain,

Sincerely,

GREGORY A. MILLER
STATE REPRESENTATIVE, DISTRICT 56

GAM/dfl

cc: Dr. William P. Klein, Jr.

Received By
CEMVN-EX
US Army Corps of Engineers
New Orleans District

SEP 19 2013

PROTECTING YOU AND YOUR FAMILY

The Board of Commissioners
OF THE
Pontchartrain Levee District

2204 ALBERT STREET • P.O. BOX 426 • LUTCHER, LA 70071
TEL: 225-869-9721 FAX: 225-869-9723 LA WATTS: 800-523-3148

STEVEN C. WILSON
PRESIDENT

LEONARD C. IRVIN, SR.
VICE PRESIDENT

COMMISSIONERS
PATRICK BELL, SR.
RICKY BOSCO
MARTY J. POCHE
JERRY SAVOY
ALLEN J. ST. PIERRE, SR.

DWIGHT D. POIRRIER
SPECIAL COUNSEL

SUSAN M. SHEETS
BOARD SECRETARY

MONICA T. SALINS
EXECUTIVE DIRECTOR

October 4, 2013

VIA EMAIL AND U.S. MAIL:
Colonel Richard L. Hansen
c/o William Klein, PhD
Regional Planning and Environment Division-South
New Orleans District, U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

WSLPAdmin@usace.army.mil;

Dear Colonel Hansen and Dr. Klein:

As Executive Director of the Pontchartrain Levee District, I have reviewed the Integrated Draft Feasibility Report and Environmental Impact Statement for "West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study." I have also listened, carefully, to every comment and every concern of the residents within the parishes of St. Charles, St. John the Baptist, St. James and Ascension at the public meetings on this report and as a result, I offer several comments, observations, suggestions and questions on behalf of the Pontchartrain Levee District:

a. Economic benefits only looked at losses to residential and commercial structures. Therefore, benefits for Alternatives A & C are actually overstated and the benefits for Alternative D are understated-- thus misrepresenting the benefit to cost ratio. The report assumes exactly the same benefits for all alternatives. We know this is not actually correct.

   The non-structural approach does not account for losses to vehicles, farm equipment, livestock, power sub stations, gas pumps, sewerage systems, potable water systems, and other physical items that will not be elevated, cannot be elevated, or able to be evacuated prior to a storm event. What about crops? A surge that recedes quickly might not cause any significant damage to any given crop, but what if water sits and recedes slowly - the crop could be lost. Also, undesired levels of salt could be permanently deposited on the land causing irreversible damage to crop land. Grand

Pointe's Perique tobacco crop would be significantly vulnerable. This was a real occurrence during Hurricane Isaac.

The non-structural approach "assumes" everyone will participate. What if someone doesn't like the idea of moving or having their house raised – they don't get protection? What if the Corps decides their house isn't worth raising? Then what would happen? Are they forced to move? That's not acceptable. Families want to stay living by each other. This type of alternative should ONLY be considered as a last resort if a levee isn't viable. In this case, the cost of construction for Alternative D is only about 1% higher than C. So the adverse social impacts of going with Alternative C over Alternative D are worth 1% in cost. What? At the St. James Public Meeting a representative from the Corps told everyone present that it was the average annual costs that drove the annualized net benefits. In the Economics Appendix D, the annual expenditures for Alternatives A and C have been under estimated. It assumes the non-structural costs will be equally divided over 50 years. Why aren't the structures projected to flood by 2020 not being raised at the same time the levee is constructed. Do we really need to flood homes and businesses before we raise the structure?

b. In the presentation presented at the public meetings there was a slide "Comparing Plans" wherein it referenced "…Annual Cost." If the Operation and Maintenance (O&M) costs are 100% non-federal and the locals fully embrace the responsibility for these costs – why not do a "what-if" scenario of the alternatives with the O&M costs excluded and see how the benefit to cost ratios compare with just construction costs. If that's not a Federal cost, the local sponsor and Parishes are knowledgeable and willing to absorb the O&M costs, then why include it in the selection of alternatives? Just because some regulations say so? That does not mean it is correct or proper. I understand that it is not likely to get a change to the policy governing how this is computed any time soon but, as 50% local sponsor/owner of this study, I request that a "what-if" scenario be included and factored in the report for informative purposes to show how close Alternatives C and D actually are.

c. Page 2-7 talks about an LCA Convent Blind River Diversion (CBRD) project has the potential to locally reduce stress and improve dissolved oxygen (DO) levels, so the report admits to a salinity problem. The levee would do wonders to help that. It also says that the Maurepas Swamp is expected to continue to decline and convert to open water without the project. Why are we being assessed mitigation costs against the project, when the report clearly indicates these wetlands will be lost by 2070 due to subsidence and sea level rise? Wouldn't you think that the protection levee would

help protect the 79 square miles of wetlands? Where is the proof that the wetlands behind the levee will be lost by 2070; why doesn't the project get mitigation credits for saving 79 square miles of wetlands?

d. On page 2-13, I strongly disagree that with no action there would be NO direct impact on community and regional growth. If there is no protection provided, the impact from Biggert Waters Act is going have a MAJOR adverse impact to community and regional growth. The regional growth would come to a screeching halt and then decline. We are not advocating development of wetland areas for community growth, in fact we have offered to purchase private wetlands and put them in public trust, but there are vast agricultural land that could be developed.

e. I disagree completely about the indirect and cumulative damage to wetlands. Interstate 10 already serves as a barrier to the wetlands, as a 'levee.' The culverts underneath do not pass much water, a USACE analysis has indicated this; unfortunately the resource agencies have refused to accept the analysis. The Corps should be counting the benefits for protecting the marsh, not charging for mitigation for damaging it. That does not make sense.

   On page 3-12 it states that "…Alternative D poses potential uncertainties concerning impoundment of large areas of wetlands, especially if the river diversions are constructed. While it would prevent saltwater intrusion, it would risk impacting the hydrology by enclosing approximately 54,800 acres of swamp and would impact the EQ of the Maurepas WMA as well as Blind River…". Where is the evidence that the levees will damage the wetlands? I cannot find the answer within this report. It does not exist. It is the opinion of the environmental types.

   What about where the levees have helped the wetlands? Anyone can see for themselves if they drive down I-310 where the levees have helped along the LP&V, Hurricane Protection Levee, St. Charles Parish polder. The cypress trees are bare and deteriorated near Lake Pontchartrain and the cypress trees are vibrant and healthy along Airline Highway (U.S. Hwy. 61) behind the St. Charles Parish Hurricane Protection Levee. There is your evidence. You can see it on the way to Grand Isle when you cross the levee in Golden Meadow. Look up aerial photos of South Lafourche after Hurricane Rita and you can see open water outside the protection levee and healthy, vibrant, forested wetlands inside the protection levee. Again, this is a bad thing? I have not seen it first hand, but I am told that the same vibrant wetlands exist in St. Bernard Parish and down in Plaquemines Parish.

f. Throughout Section 4 of the report, the direct and indirect impacts of the non-structural approach is played down. There is reference to temporary interruption to service, inconveniences, and possible relocation of services elsewhere. I do not see where the costs associated with these impacts are accounted for in Alternative A and Alternative C. There are definitely costs associated with interruption in service – to both the service provider and the consumer. Reduction in tax revenues and property values is only briefly referenced as though it is an insignificant topic. This section is insulting.

g. The Mississippi River Corridor between New Orleans and Baton Rouge is a major industrial and petro-chemical plant hub for the country. Products from these industries and plants are shipped via pipeline to all parts of the country. Alternative D provides the least impacts to these pipelines compared to Alternatives A and C, 14 pipeline crossings versus 36 versus 70, respectively. We have reviewed the pipeline relocation costs and feel these costs have not been fully evaluated. While the construction cost to relocate the pipelines was included per Engineering Appendix B, the pipeline outage cost and loss of material cost were not included. Those are significant dollar figures to leave out of this study. If AT&T charges $6,000 per minute for lost time on a fiber optic line, what is the cost for 6", 12", 18", 24" and larger pipelines? How many gallons of product will be wasted during the tie-in procedure and what is that cost?

h. If Alternative A or C are constructed, what will be the induced flooding impacts on St. James and Ascension Parishes? I could not find any discussion in the study on this topic except for Real Estate Appendix C. The paragraph stated the induced flooding impacts have not been evaluated to date but will be done in the future. PLD wants to know the incremental induced flooding impact to St. James and Ascension Parishes based upon Alternatives A and C and the cumulative induced flooding impacts to St. James and Ascension Parishes for the entire Lake Pontchartrain and Vicinity Program since the enactment after Hurricane Betsy. The most recent USACE evaluation only considered the pre- and post- Hurricane Katrina induced flooding impacts which does not include any reduction of flooding/storage areas in St. Bernard, Orleans, Jefferson and St. Charles Parishes.

i. PLD does not feel the study has included enough benefits for the protection of the federal and state highway systems in Alternative D. Alternatives A and C leave 15 miles of Interstate 10 unprotected.

We all witnessed, firsthand, during Hurricane Isaac the flooding impacts to Interstate 10, US Highway 61, and LA Highway 3125. The only roadway passable was LA Highway 44 along the Mississippi River levee. Vehicles traveling to New Orleans from Baton Rouge were required to take Interstate 12 to Covington and then south across the Lake Pontchartrain Causeway Bridge. Interstate 55 was closed in Ponchatoula due to floodwaters overtopping the Interstate. The Federal Highway Administration (FHWA) has approved computer models that calculate the amount and cost of delay. We have been told that the USACE does not have an approved model to calculate delay and compute delay costs. I don't understand why a computer model approved by the FHWA, responsible for the entire nation's transportation infrastructure, cannot or has not been approved by another federal agency, USACE. Further, why was the delay cost ignored and not included just because the USACE does not have an official method to calculate the cost. An estimated cost is better than nothing, but unfortunately the study failed to consider that too.

As stated previously, Alternatives A and C leave 15 miles of Interstate 10 unprotected. PLD has been told that since the FHWA does not have an authorized project to raise or elevate that section of highway, the USACE couldn't claim benefits based upon their regulations. Are we all to assume that Interstate 10 is to be abandoned in 2070 when the subsidence and sea level rise overtop the roadway? Improvements to the Interstate system are typically funded by Federal dollars with the Federal funding share between 80% and 90%. It is clearly cheaper to build a levee than significantly raise the roadway or elevate on structure. This is another instance where a USACE regulation seems to run contrary to common sense.

j. In Paragraph 1.3 of the study, there is discussion of the severe impacts of Hurricane Isaac on the Port of South Louisiana. I cannot find any reference in the calculation of benefits for the Port of South Louisiana in the document. Why were they excluded?

k. I could not find any impacts to industry in the document for either St. John the Baptist or St. James Parishes. This is an exceptionally large benefit to the project. From our experience on the LP&V, Hurricane Protection Levee- St. Charles Parish polder, large petrochemical plants incur approximately $5,000,000.00 per day of losses for extended shutdown days beyond a typical three day hurricane shutdown. PLD, through it's consultant, have contacted industries and will forward that information to you once it is received.

l. Based upon the damages to St. John the Baptist and St. James Parish during Hurricane Isaac, has the USACE compared actual losses versus the projected losses outlined in the study to determine the validity of benefit projections?

m. Ascension Parish benefits have been completely ignored. PLD has been told by USACE Council that the parish could not be included since Ascension Parish was not in the authorized study area. When PLD contacted the Louisiana Congressional Delegation to include Ascension Parish in the study area, the New Orleans District requested we not change the study area because it would delay the study two years. Alternative D will provide structural protection to Ascension Parish yet benefits will not be accounted in the benefit to cost ratio but the costs have been included. This is another instance where a USACE regulation seems to run contrary to common sense.

Please place these comments, observations, suggestions and questions into your report, and as 50% owner of this study, I trust that the answers to these questions and ALL of the questions submitted by ALL interested parties from the public meetings, email and U.S. Mail will be provided to this 50% owner, the Pontchartrain Levee District, within thirty (30) days after the close of comment period, on or before November 18, 2013.

Pontchartrain Levee District's partners, St. Charles, St. John the Baptist, St. James and Ascension Parishes, are all in agreement and are in favor of Alignment D. Likewise, Pontchartrain Levee District has been partners with USACE for many years and as a "partner," the Pontchartrain Levee District has confidence to be treated as such - of equal rank, consideration and compromise where and when there are differences.

Very truly yours,

MONICA T. SALINS,
Executive Director

cc: PLD Board of Commissioners
CPRA
St. James Parish President, Timmy Roussel
St. John the Baptist Parish President, Natalie Robottom
Ascension Parish President, Tommy Martinez

THE BOARD OF COMMISSIONERS
OF THE
PONTCHARTRAIN LEVEE DISTRICT

St. Charles Parish President, V.J. St. Pierre
Senator Troy Brown
Senator Gary Smith
Senator Jody Amedee
Representative Randal Gaines
Representative Eddie Lambert
Representative Ed Price
Representative Gregory Miller
Representative Clay Schexnayder
Representative John Berthelot
U.S. Senator Mary Landrieu
U.S. Senator David Vitter
U.S. Representative Cedric Richmond
U.S. Representative Bill Cassidy

LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT
PO Box 94245 | Baton Rouge, LA 70804-9245
ph: 225-379-1232 | fx: 225-379-1863

Bobby Jindal, Governor
Sherri H. LeBas, P.E., Secretary

DOTD Comments on Draft Report for West Shore Lake Pontchartrain Study

It is definitely in DOTD's best interest to strongly encourage Alignment D as compared to the current recommendation from the Corps of selecting Alignment C.

While Alignment C addresses the majority of the flooding issues in the LaPlace area that were experienced during Isaac, it is our opinion that this alignment is short-sighted and will not protect the I-10 corridor west of the Reserve Relief Canal that will be continuously exposed to an ever increasing level of flood risk in future year events due to relative sea level rise. To mitigate the I-10 flood risk for this unprotected area, DOTD will be forced to consider elevating I-10 via grade raising or an elevated bridge section or some combination thereof from the Reserve Relief Canal to the Sorrento Area or beyond unless Alignment D is selected. It is estimated that an elevated bridge section using $100/square foot for an approximate 15 mile section to Sorrento would cost between $700 Million to $1 Billion. Grade raising of the same section of I-10 to an elevation that would avoid future inundation would cost approximately $265M. It is clear that DOTD will incur significant costs in the future to mitigate I-10 flooding that could be avoided by construction of levee Alignment D. Since both roadway and levee improvements involve federal funding, it would seem logical to consider the construction costs of both to determine the most cost effective solution for flood protection of the local community and flood protection to our interstate highway system.

Under current conditions Alignment C would leave 14 miles of I-10 and US 61 pavements from I-10 at US 61 to the Reserve Relief Canal Bridge exposed to repeated and sustained flooding as well as subsequent erosion and base failure with the recession of the floodwaters. Each time an event occurs, funds and manpower would be expended to assess the damage, estimate the cost of repair, construct a repair, and a minimal mitigation for future events as is currently occurring due to Hurricane Isaac. The construction of a levee that would tie into the existing flood protection system of Ascension Parish would protect all of the I-10, the US 61corridor and the railroad that parallels US 61 for this entire length. The additional 10 miles of levee for Alignment D would raise the estimated price from $881 Million to $891 million. Elevating I-10 would be more expensive and not provide any flood protection if an elevated option was chosen, and not the same level of protection if the grade raising option was selected.

Relative sea level rise will only exacerbate the problem. Future improvements to the levee system would be much more easily constructed at a much reduced costs compared to roadway improvements which in turn reduces the long term cost of maintaining an acceptable level of protection for this area.

It is also DOTD's concern to keep I-10 open throughout Louisiana not just in Laplace. I-10 in New Orleans East before the levee and I-10 on the Northshore floods first due to the storm surge coming in from the Rigolets and Chef Pass before reaching Laplace area. Mainline I-10 in these

two areas usually rises above the floodwaters as they recede but some of the intersections have remained flooded for almost as long as Laplace in Isaac. There is also a concern at the beginning of EB Twin span for potential of being washed out or storm debris blockage at this location. Figure 1-3 on pg. 9 of the report shows areas that will flood before Laplace is affected.

If features were connected to existing flood protection and constructed further to the East along the Rigolets and Chef Pass to cutoff the surge before it even gets into Lake Pontchartrain then they would provide a larger benefit to the entire area. It would be approximately the same levee distance through marsh but the cost benefit should be greater considering it would protect all the assets around the lake including the Laplace area, entire Northshore and providing redundant protection for the Southshore. If constructed this would also provide protection to all highway assets for evacuation/reentry purposes throughout the area.

Specific Study Comments

- The Report Study (surge model) seems to have not considered the rainfall intensity and duration. Hurricane Isaac's rainfall duration contributed to the flooding of I-10.

- Sheet No. 8 of Appendix B - Engineering states that all the structures are designed based on a 10-year, 24 hour rainfall. If any of these structures are considered as cross drains, our policy for cross drain design is ADT based (50-year when ADT > 3000, and 25-year when ADT < 3000). The size of the drainage area also determines calculation method (NRCS or USGS).

- Existing drainage patterns must be maintained or addressed and improved with the construction of any levee.

State_10-07-2013_1_Jimmy L Anthony

BOBBY JINDAL
GOVERNOR

State of Louisiana

DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF WILDLIFE

ROBERT J. BARHAM
SECRETARY

JIMMY L. ANTHONY
ASSISTANT SECRETARY

October 7, 2013

Attn: Dr. William P. Klein, Jr.
U.S. Army Corps of Engineers
Regional Planning and Environment Division South
New Orleans Environmental Branch
CEMVN-PDN-CEP
P. O. Box 60267
New Orleans, LA 70160-0267

RE: *Draft Environmental Impact Statement (EIS) - West Shore Lake Pontchartrain, Hurricane and Storm Damage Risk Reduction*
Notice Date: August 23, 2013

Dear Dr. Klein:

The staff of the Louisiana Department of Wildlife and Fisheries (LDWF) has reviewed the Draft EIS for the West Shore Lake Pontchartrain, Hurricane and Storm Damage Risk Reduction project. The Draft EIS proposes potential solutions to reduce damages from hurricanes and tropical storm surge for residents in St. Charles, St. John the Baptist and St. James Parishes. As a member of the Habitat Evaluation Team (HET), LDWF has worked closely with the U.S. Army Corps of Engineers (USACE) and other resource agencies to provide comments and recommendations throughout the "Smart Planning" process.

In general, given the abbreviated feasibility study period, the implementation of the new "Smart Planning" process and the potential for adverse impacts to hydrology, fisheries productivity, wildlife resources, water quality and wetlands, LDWF believes that the Draft EIS does not adequately address all aspects of the potentially significant long-term, indirect and cumulative impacts to these ecological services. Despite these limitations, LDWF submits the following comments in accordance with provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) and as the potentially affected landowner of Maurepas Swamp Wildlife Management Area (WMA). We recommend that each of these comments be satisfactorily addressed.

General Hydrologic Comments

Hydrologic information being presented to the HET has been insufficient particularly with respect to flood gate and environmental structure design and operation plans. Information has been provided to the HET in a rapid manner with impractical review and comment deadlines. The cumulative impacts of structural protection to the productivity and sustainability of Maurepas Swamp, Lakes Maurepas and Pontchartrain, and Blind River are difficult to determine. Complicating the matter is the fact that only preliminary modeling efforts have been completed. Of particular concern is the high probability that flood gates and environmental structures will be closed with increased frequency and duration in

the future for salinity control purposes, which strongly suggests increasing fisheries and wetland impacts over time. We suggest that these important design and operation uncertainties be resolved immediately so that reliable predictions of impacts can be determined. Additionally, environmental structures sizing should be contingent upon modeling and identified in the Draft EIS. Furthermore, with the levee in place, pumps and their operation will be significant in maintaining the health of the Maurepas Swamp WMA and Blind River, a Louisiana designated Natural and Scenic River.

General Aquatic Species Comments

Structure operation fisheries effects should include structure closure effects (timing and duration of closure and how this could change with time), open structure effects (changes in flow, concentrating/limiting migration corridors, and reduction in access), and how this could alter local population dynamics of aquatic species at all life stages. The Draft EIS may not have adequately addressed if and how aquatic species will be affected.

While we appreciate all efforts and understand that everyone is operating on a compressed scheduled, we feel that potential impacts should be adequately quantified using Wetland Value Assessment (WVA) methodology prior to the release of the Draft EIS. Any attempt to assess potential impacts to wetland function or fisheries production needs to incorporate the types and number of flood gates and environmental control structures that will be present in the levee design, how these structures will be operated, how these structures could affect wetland hydrology and fish access to and from critical habitats at all life stages, and how these structures could affect the recruitment of commercially and recreationally important aquatic species. While environmental control structures have been mentioned in the Draft EIS to improve hydrologic and fisheries connectivity, it is unclear how aquatic organisms respond to/use these structures or if natural organism movement through these structures occurs. Furthermore, it should not be assumed that the mere presence of these structures is comparable to natural conditions and removes the possibility of negative impacts to the wetlands.

Compatibility w/ Planned Restoration Projects

Throughout the process, it has been mentioned that other local, state, and federal wetland restoration projects in the area will reduce the impacts of salt water intrusion, and that the levee itself is a form of wetland restoration. The potential benefit that a levee would have on wetland habitat would be preventing wetland loss on the inside through erosion and scour during storm surge events. However, these sporadic storm event benefits might be contradicted by long-term wetland degradation resulting from levee hydrologic interference. It would be more appropriate to discuss the other local, state, and federal wetland restoration projects (i.e., Convent to Blind River, Hope Canal Diversions, etc.), their interaction with the levee, and ecosystem response in a separate section; and to clarify that these restoration projects are not part of the levee plan, although they should be incorporated. Provided that restoration projects include freshwater introductions, how these projects would influence structure operation (closure time and duration) should be considered. Given that these state/federal coastal restoration projects are recommended as restoration for the Maurepas Swamp, we believe these restoration projects deserve more discussion in the Draft EIS. These separate local, state, and federal restoration projects are better suited to address the described coastal land loss issues than levee construction, where as with levee construction the primary goal is infrastructure protection. We also recommend further detailed discussion on how the presence of a levee could negatively impact the effectiveness of these restoration projects inside and outside of the levee (un-natural hydrologic/marsh flooding regimes, formation of stagnant/low circulation areas, high flow areas around structures increasing erosion rates, etc).

Specific Comments on Draft EIS

Page 3-12, Alternative D; Page 4-22, Alternative D; Page 6-4, Section 6.16 Wild and Scenic River Act of 1968 (Rivers). Blind River is a "Natural and Scenic River," not a "Wild and Scenic River." The legislation that established the Natural and Scenic Rivers System is referred to as the "Louisiana Scenic Rivers Act" (R.S. 56:1840-1856) not the "Wild and Scenic River Act."

Pages 4-15 and 4-17, Multiple Sections. *"However, preliminary hydrologic modeling indicates that the project design would have minimal changes to flows or stages on either the protected or unprotected sides."* This part of the document needs clarification on affects both inside and outside the system, including detailed information on how the water moves in and out of the system and locations of all rivers, bayous, streams, etc. that would be impaired. Providing a visual aid in the document may assist in planning and analysis. We would recommend such a statement be removed until further detailed analysis and modeling can be done and agreed upon by the HET.

Page 4-18, Section 4.3.5 Essential Fish Habitat, Alternative C. *"Closure of the levee system during hurricane/tropical storm surge events would reduce minor salt water intrusion into wetland habitats in the proposed levee system. This could provide some reduction of the potential ecological stresses associated with saltwater intrusion and could also help reduce the conversion of existing forested wetlands and swamps to marsh and open water habitats (EFH)."* Similarly, diversions could reduce salt water intrusion. Clarification is needed here to give rise to an understanding that the sole purpose of the levee is to protect life and property not to prevent salt water intrusion into wetlands; the claim that the levee system protects the wetlands is somewhat debatable. We caution making assumptions that the levee would ease wetland loss, while although there are signs of degradation, proven restoration techniques would benefit the system naturally and still maintain the storm surge buffer. It is stated in the Draft EIS that hydrologic and fisheries impacts will be minimal because salinity modeling shows little change. Salinity models do not take into account major hydrologic and ecological characteristics such as marsh flooding frequency, increasing flow velocities, and aquatic organism access reductions that can have substantial impacts on wetland and fisheries productivity and would differ inside and outside of the proposed levee. Furthermore, discussions in this section and others may be warranted regarding potential changes in velocities as a result of gates and/or environmental structures and its effects on aquatic species passage.

Page 4-18, Section 4.3.5 Essential Fish Habitat, Alternative D. This section discusses inclusion of a water control gate on Blind River, a designated Natural and Scenic River. It is mentioned that this structure may have impacts; however, there is a lack of discussion in the aquatic resources section especially with respect to fish passage through various structures or the above mentioned increased velocities. Furthermore, increased feeding opportunities at structures on bait fish could augment the natural processes. Discussions, in this section and others, may be warranted regarding potential changes in velocities as a result of gates and/or environmental structures and its effects on aquatic species passage.

Economics, Appendix D. Discussion, in this section or another, may be warranted regarding potential loss of recreational and commercial hunting, fishing, and boating opportunities and associated economic impacts as result of the proposed levee construction. This issue does not appear to be adequately addressed in the Draft EIS, especially with respect to frequency of closures. Also, the document did not seem to address navigation impacts and the possibility of boats being trapped outside the system during storm events, subsequent closures and those economic impacts.

Maurepas Swamp WMA

In the past year LDWF estimates that there were 22,673 Maurepas Swamp WMA users. Many of these users utilize small waterways to access the WMA. There are also private inholdings and these owners rely on water access. If water control structures are only provided at Blind River, Mississippi Bayou and Reserve, Hope and Conway canals, user access will certainly be disrupted.

The loss of recreational access areas on and to the WMA, including Hope Canal Road, Hope Canal boat launch, and Reserve Canal launch, should be avoided, as access is already a limiting factor on the WMA. If impacts to these important public access areas are not avoidable, alternative public access (i.e., roads and launches) should be planned for. Alternative access shall be determined only after close coordination with LDWF and other stakeholders, and shall be incorporated into the project design.

Blind River - Natural and Scenic River

Cross-Sections that have been provided to LDWF from other applicants depict Blind River, from top-bank to top-bank, to be approximately 300 feet wide at I-10. LDWF is concerned that the proposed 40-foot wide, 20-foot deep structure is inadequate to maintain current stream flow patterns without adversely affecting hydrology (i.e., tidal flows, periodic/seasonal high flows, and depth, duration and frequency of floodplain flooding). Should Alternative D be selected, detailed analysis/modeling would need to be provided that demonstrates that the existing shoreline of Blind River is not altered by levee and gate construction. **Reservoir construction is prohibited** by the Louisiana Scenic Rivers Act (R.S. 56:1853). Reservoir construction is defined in the Act as "any permanent dam or impoundment which **alters the shoreline** of a natural and scenic river" (R.S. 56:1842).

Compensatory Mitigation

The proposed levee project will result in the direct loss of forested wetlands within the Maurepas Swamp. Currently, elimination of nutrient and freshwater inputs threatens the sustainability of these forested wetland systems. LDWF believes that the most effective strategy to restore health and productivity of the Maurepas Swamp is construction of Mississippi River reintroductions into the Swamp. However, additional measures such as eliminating barriers to surface flow patterns are also needed, not only to compliment the planned river reintroductions, but also to improve current hydrologic conditions. Therefore, LDWF recommends that mitigation measures aim to enhance or improve surface hydrology, such as gapping and degrading spoil banks and other artificial impediments to sheet flow. Also, collecting available wastewater and/or stormwater from surrounding communities and distributing it through the swamp could be an additional mitigation measure.

In order to be considered adequate, the compensatory mitigation must reflect on short and long-term direct and indirect impacts to wetland and fisheries production, which at this time is not present in the Draft EIS. Any mitigation plan should include long-term monitoring and be adaptive in nature to account for unforeseen future impacts. Furthermore, mitigation should be financially assured and proposed to be concurrent with levee construction. It's recommended to also include a long-term fisheries monitoring plan to determine if substantial fisheries impacts are occurring from levee construction and once completed, floodgate and environmental structure operation. We look forward to continued work with USACE and resource agencies to insure that adequate and appropriate mitigation is determined and a plan included in the final EIS.

Bird Nesting Colonies

Our LNHP database indicates the presence of bird nesting colonies within one mile of the western end of Alignment D. Please be aware that **entry into or disturbance of active breeding colonies is**

prohibited by LDWF. In addition, LDWF prohibits work within a certain radius of an active nesting colony.

Nesting colonies can move from year to year and no current information is available on the status of these colonies. If work for the proposed project will commence during the nesting season, conduct a field visit to the worksite to look for evidence of nesting colonies. This field visit should take place no more than two weeks before the project begins. If no nesting colonies are found within 400 meters of the proposed project, no further consultation with LDWF will be necessary. If active nesting colonies are found within the previously stated distances of the proposed project, further consultation with LDWF will be required.

To minimize disturbance to colonial nesting birds, the following restrictions on activity should be observed:

- For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, roseate spoonbills, anhingas, and/or cormorants), all project activity occurring within 300 meters of an active nesting colony should be restricted to the non-nesting period (i.e., September 1 through February 15).
- For colonies containing nesting gulls, terns, and/or black skimmers, all project activity occurring within 400 meters of an active nesting colony should be restricted to the non-nesting period (i.e., September 16 through April 1).

Manatees

Manatees (*Trichechus manatus*) are known to occur in the surrounding water bodies of Alignment D. Manatees are large mammals inhabiting both fresh and salt water. Although most manatees are year round residents of Florida or Central America, they have been known to migrate to areas along the Atlantic and Gulf Coast during the summer months. Manatees are an endangered species protected under the Endangered Species Act of 1973 and the Federal Marine Mammal Protection Act of 1972. In Louisiana, taking or harassment of the manatee is a violation of state and federal laws. Critical habitat for manatees includes marine submergent vascular vegetation (sea-grass beds). Areas with sea-grass beds should be avoided during project activities if possible.

General Conclusions

Finally, the Department understands that work thus far has been preliminary; however, we have concerns that some aspects of ecological impacts will be overlooked with the implementation of "Smart Planning." Additionally, we understand that there has been local support for Alignment D. While we understand why there is local support for Alignment D, as a resource agency we support the Tentatively Selected Plan (i.e., Alignment C) because it is one of the least environmentally damaging alignments. However, by limiting selection to only three alternatives, opportunity to further reduce impacts is lost. For example, Alignment D is purported to provide protection to I-10. However, elevating more sections of I-10 would also provide a secure evacuation route. Another example would be construction of ring levees around the communities located outside of Alignments A and C or extending levee Alignments A and C westward along U.S. Hwy 61 to encircle additional communities such as Lutcher and Gramercy. These types of alternatives could assist with avoiding impacts to the Maurepas Swamp and Blind River which play an important role in the livelihood of many recreational and commercial users while at the same time extending levee protection to other communities.

The Louisiana Department of Wildlife and Fisheries submits these recommendations to the U.S. Army Corps of Engineers in accordance with provisions of the Fish and Wildlife Coordination Act (16 U.S.C.

661 et seq.). Please do not hesitate to contact Kyle Balkum at 225-765-2819 should you need further assistance.

Sincerely,

Jimmy L. Anthony
Assistant Secretary

c: CPRA, Baton Rouge, LA
LDNR, OCM, Baton Rouge, LA
EPA, Dallas, TX
USFWS, Lafayette, LA

BOBBY JINDAL
GOVERNOR

State of Louisiana

OFFICE OF THE GOVERNOR

Post Office Box 94004
Baton Rouge, LA 70804-9004

October 25, 2013

Dr. William Klein
Regional Planning and Environmental Division - South
U.S. Army Corps of Engineers, New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Dr. Klein,

In accordance with La. R.S. 49:214.3.1(B)(1)(c) and (d), the State of Louisiana hereby submits the following comments on the "West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study – Integrated Draft Feasibility Report and Environmental Impact Statement" released on August 23, 2013, which represent the official state position on this study and are consistent with those of the Coastal Protection and Restoration Authority (CPRA). As is consistent with the referenced statutes, the provisions of this letter shall supersede any inconsistent comments submitted by the state.

First, the state would like to commend the U.S. Army Corps of Engineers (USACE) for its commitment to the "West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study." While the study was authorized by resolutions of the U.S. House of Representatives Committee on Public Works in 1971 and the U.S. Senate Committee on Public Works in 1974, the recent commitments of Col. Ed Fleming and Col. Richard Hansen resulted in the expedited completion of this report. The state would also like to commend your work and that of Jeff Varisco in managing this work. We appreciate your recognition of the importance of the West Shore project.

The state recognizes the need for hurricane and storm damage risk reduction for the four parish area of St. Charles, St. John the Baptist, St. James, and Ascension Parishes. As such, we identified a proposed levee alignment similar to Alignment D in our 2012 Coastal Master Plan. After a preliminary review of the draft report that recommends Alternative C as the tentatively selected plan (TSP), we offer the following comments.

- The report states that Alternative D is estimated to enclose more wetland acres (56,228 acres) than Alternative C (8,424 acres) and therefore assumes greater negative impacts to wetlands. However, the report does not identify what the indirect negative environmental impacts will be to the wetlands and how those impacts may be calculated. The report appears to apply differing standards to wetlands under Alternative C than when considering Alternative D. Specifically, the report documents that Alternative C "would

provide for the protection of protected side wetlands, potentially extending their lifespan and their water quality functions." However, the potential added value of protecting more wetland acreage is not disclosed for Alternative D. The report should clearly describe the methodology used to assess levee impacts and benefits to wetlands and be consistent in that methodology for each proposed alignment.

- Although the report provides an outline of the area receiving non-structural measures as part of Alternative C, the report should include a detailed list of businesses and residences being elevated and the associated costs for each. Businesses such as Colonial Sugar, Rain CII, Noranda Alumina, Petrologistics, Nalco, Nucor, OxyChem, Methanex Shell Geismar, Shell Convent, and Impala, to name a few, do not appear to be included in the non-structural measures component of Alternative C. The report should document why such businesses are not included if that is the case and how the economic and disruption consequences of such exclusions are quantified. The report should also include an induced flooding analysis to document how the non-structural measures area was derived and what the impacts will be to all areas not included in the non-structural measures as part of Alternative C.

- As noted in comments submitted by the Louisiana Department of Transportation and Development, the lack of hurricane and storm damage risk reduction for US-61 and portions of I-10 are significant. As witnessed during recent hurricanes, these roads are major hurricane evacuation and recovery routes for south Louisiana. The report should consider the economic impacts to commerce in Louisiana and the Nation if such routes are flooded with Alternative C, as seen during Hurricane Isaac. The report should also consider the incremental economic difference in emergency response and recovery costs if such routes are flooded (i.e. flying versus driving).

- The final report should fully document the deterioration of culture and of community cohesion due to Alternative C with respect to elevating some residences, businesses, and public facilities but not others and how this alternative would affect future population projections, employment opportunities and economic activity. The report should also document the negative impacts to communities due to ingress and egress limitations that would be exacerbated with Alternative C.

- The report should disclose the quantification of economic impacts to Louisiana and the Nation of Alternative C to business and industry shut-downs due to induced flooding of these businesses and induced flooding of secondary roads resulting in staffing deficiencies as compared to Alternative D. An induced flooding evaluation for the entire four parish project area should be included in the report to document water levels and water flows under Alternatives C and D so that economic impacts can be properly evaluated prior to the selection of a TSP.

- Finally, Appendix A, Table 2 and Section 3.4 of the report should include the U.S. Fish and Wildlife Service (USFWS) alternatives as proposed in its October 9, 2012 letter and describe why those alternatives were screened out. In addition, any information available

to date for the USFWS alternatives with respect to costs, benefits, and impacts should be included in the report to further document why those alternatives were not considered for further analysis.

The 2012 State of Louisiana Comprehensive Master Plan for a Sustainable Coast recommended an alignment most similar to Alternative D in the draft feasibility report. This master plan was unanimously approved by the Louisiana Legislature. Although Alternative D was not selected, the state recognizes that Alternative C does include a portion of the Master Plan alignment from the Bonnet Carré Spillway to the crossing at Interstate 10 and supports moving forward with this portion of the proposed Alternative C as an interim step. However, we also support protection measures to the west of Alternative C and would like the opportunity to investigate solutions for inclusion of these measures. Accordingly, we request that the USACE include documentation of benefits and impacts in the report for alternatives proposed to the west of Alternative C (e.g., the USFWS proposed Alignment C-1a and C-1b, as noted in St. James Parish's October 2, 2013 correspondence) that provide similar levels of protection as Alternative D. Based on the information provided by stakeholders and comments received during the public meetings, we also request a reevaluation of the cost-benefit ratios calculated for Alternatives C, D, C-1a, and C-1b.

Our common priority here is addressing the unacceptable vulnerability in the West Shore scope area. The state, through the CPRA, remains committed to this project and to working with the Pontchartrain Levee District as co-non-Federal sponsors to provide a Letter of Intent for the project in the future. The state strongly believes hurricane and storm damage risk reduction is needed for St. Charles, St. John the Baptist, St. James, and Ascension Parishes and continues to support the project and believes that we can work with the USACE to ensure the best alternative is selected.

Sincerely,

Garret Graves,
Executive Assistant to the Governor for Coastal Activities

cc: Secretary Sherri Lebas, Louisiana Department of Transportation and Development
Secretary Robert Barham, Louisiana Department of Wildlife and Fisheries
Asst. Secretary Jimmy Anthony, Louisiana Department of Wildlife and Fisheries
Administrator Chris Knotts, Public Works and Water Resources Division, Louisiana Department of Transportation and Development

State_7-26-2013_5_Cleve Hardman

JAY DARDENNE
LIEUTENANT GOVERNOR

State of Louisiana
OFFICE OF THE LIEUTENANT GOVERNOR
DEPARTMENT OF CULTURE, RECREATION & TOURISM
OFFICE OF STATE PARKS

CHARLES R. DAVIS
DEPUTY SECRETARY

STUART JOHNSON, PH.D.
ASSISTANT SECRETARY

August 26, 2013

Dr. William P. Klein, Jr.
U.S. Army Corps of Engineers
Regional Planning and Environment Div. South
New Orleans Environmental Branch
ECMVN-PDN-CEP
P.O. Box 60267
New Orleans, LA 70160-0267

Re: West Shore-Lake Pontchartrain Draft Environmental Impact Statement

Dear Dr. Klein,

I am in receipt of your draft environmental impact statement (EIS) for the West Shore-Lake Pontchartrain Hurricane and Storm Damage Risk Reduction. The Division of Outdoor Recreation administers the Land and Water Conservation Fund (LWCF) for Louisiana.

Our staff has identified seven LWCF-assisted sites within the project study area, one in St. John the Baptist Parish, six in St. James Parish and none in St. Charles Parish. Those sites are identified in the enclosed document along with GPS coordinates of each site. Our review of the draft EIS indicates none of the existing LWCF-assisted sites within the project study area would be impacted by any of the alternative plans. Indeed these sites are currently at risk unless action is undertaken to address the risk of hurricane and storm damage in this region.

We stand ready to assist in any means possible toward realization of these efforts.

Sincerely,

Cleve Hardman
Director of Outdoor Recreation

Enclosure

LWCF-Assisted Sites Within Project Study Area

Project Number	Project Name	Latitude (N)	Longitude (W)
22-00447	St. John Parish Park (East Bank)	30.07979	-90.5691
22-00451	Lutcher Park	30.050278	-90.702778
22-00473	Gramercy Park "B"	30.05465	-90.68499
22-00475	Gramercy Park "A"	30.054444	-90.691944
22-00495	Blind River Boat Ramp	30.101944	-90.735833
22-00525	Lutcher Hi Ball Park	30.0505	-90.6969
22-00828	Lutcher Park	30.050278	-90.702778

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED DRAFT FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex R

Wetland Value Assessment

Certification letter, Assumption and Spread Sheets

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

REPLY TO
ATTENTION OF

CECW-P

8 November 2011

MEMORANDUM FOR Director, National Ecosystem Restoration Planning Center of Expertise (ECO-PCX)

SUBJECT: Wetland Value Assessment (WVA) Models – Barrier Headland, Barrier Island, Bottomland Hardwood, Coastal Chenier, and Swamp Models - Model Approval.

1. The HQUSACE Model Certification Panel has reviewed the externally-developed WVA in accordance with EC 1105-2-412 and has determined that the Barrier Headland, Barrier Island, Bottomland Hardwood, Coastal Chenier, and Swamp Models and their accompanying documentation are sufficient to approve the models for regional use. The WVA models were developed by the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Environmental Work Group, an interagency team including US Fish and Wildlife Service, National Marine Fisheries Services, US Environmental Protection Agency, Natural Resources Conservation Service, USACE, and Louisiana Office of Coastal Protection and Restoration.

2. The models were initially developed in the 1990s and have been periodically revised and updated by the CWPPRA Environmental Work Group which is led by the US Fish and Wildlife Service. Models developed by non-Federal government entities, NGOs, or academic institutions which are proposed as part of a Corps planning study can be approved for use based on an assessment of the proponent's documentation demonstrating that the model satisfies the certification criteria.

3. Battelle Memorial Institute conducted an independent review of the procedural manual, community models and associated spreadsheets to assess the technical quality and usability of the model. A number of high significance concerns with the documentation of the model were raised. Further coordination with the ECO-PCX clarified that the ECO-PCX had conducted a detailed review of the model documentation and model spreadsheets to evaluate the degree to which revisions were made based on the model review comments and responses. Adequate technical reviews have been accomplished. This approval is based on the decision of the HQUSACE Model Certification Panel which considered the ECO-PCX assessments of the models.

APPLICABILITY: This approval for use is limited to applicable projects in coastal Louisiana and eastern Texas..

HARRY E. KITCH, P.E.
Deputy Chief, Planning and Policy Division
Directorate of Civil Works

Printed on Recycled Paper

West Shore Lake Pontchartrain
Methodology and Assumptions for Determining Environmental Benefits

Early Habitat Assessment applied to Final Array

To expedite the planning process prior to release of the Draft Integrated Report, and be consistent with the new Corps SMART Planning Procedures, impacts were preliminarily determined utilizing existing information about the project area from the Coastwide Reference Monitoring System (CRMS) as a surrogate for habitat quality. Feasibility-level habitat analysis using Wetland Value Assessment (WVA) methodology should be conducted on the TSP, per the SMART Planning procedures, following release of the draft Integrated EIS and Feasibility Report for public review and be included in the final Integrated EIS and Feasibility Report.

The following information is taken from the CRMS Site Level Report Cards for sites CRMS0059 (Reserve), CRMS5373 (Hope), CRMS0039, CRMS5167, and CRMS0065 (Louisiana Office of Coastal Protection and Restoration, 2013) and was used for assessment of wetland impacts.

The CRMS Site Level Report Card presents two ecological parameters that have been developed: a floristic quality index (FQI) and hydrologic index (HI). CRMS Analytical Teams, made up of agency and academic personnel, developed these indices, and others, based on the suite of parameters available from the 2006 to 2009 CRMS dataset. The FQI is used throughout the world to determine wetland quality based on plant species composition for a geographic area of interest. The FQI developed with the CRMS data is specific to coastal Louisiana. The FQI scores from 0 to 100 are calculated for a sampling station and are based on the percent cover values and the Coefficient of Conservatism (CC score) of the species present (Cretini et al. 2012). The HI jointly assesses the suitability of two critical aspects of wetland hydrology, average salinity and percent time flooded, in maximizing vegetation primary productivity. The HI score (between 0 and 100) corresponds to the percent of maximum vegetation productivity expected to occur if the separate effects of salinity and inundation interact in a multiplicative fashion on vegetation productivity (Snedden and Swenson 2012).

Based on the CRMS locations in proximity of each alignment we used a combination of site CRMS0059 (Reserve) and CRMS5373 (Hope) for Alternatives A and C and all five sites for Alternative D. We averaged the FQI for the years 2007-2012 of each set of sites by alternative, then converted the index number into a value from 0.1 to 1.0 and then did the same for the HI for years 2008-2012. Unfortunately the HI was unavailable for sites CRMS0059 (Reserve) and CRMS0065 because those sites did not meet salinity and/or water level data completeness threshold (70% per water year) in order to calculate an HI score. In that case the HI for Alternatives A and C were averaged only with CRMS0059 (Reserve) for years 2008-2012. Next we averaged the FQI and HI numbers to obtain a single value to represent the habitat quality for

each alternative. It should be noted that the FQI is calculated on the herbaceous vegetation. The CRMS Analytical Teams have developed a Forested FQI but it is still undergoing peer review. Though the forested FQI would have been a better indication of habitat quality, we feel the herbaceous FQI will still be useful in the intent of this comparison. The results of this analysis are presented in Table 1**.** Alternative C (TSP) and Alternative A have the same average FQI and HI, which was greater than Alternative D.

Table 1. Hydro Index (HI) and Floristic Quality Index (FQI) Converted to Values Between 0.1-1.0 and Averaged for each Alternative in the Final Alternative Array. Taken from Coastwide Reference Monitoring System (CRMS) Site Level Report Cards for sites CRMS0059 **(Reserve)**, CRMS5373**(Hope)**, CRMS0039, CRMS5167, and CRMS0065 (Louisiana Office of Coastal Protection and Restoration, 2013).

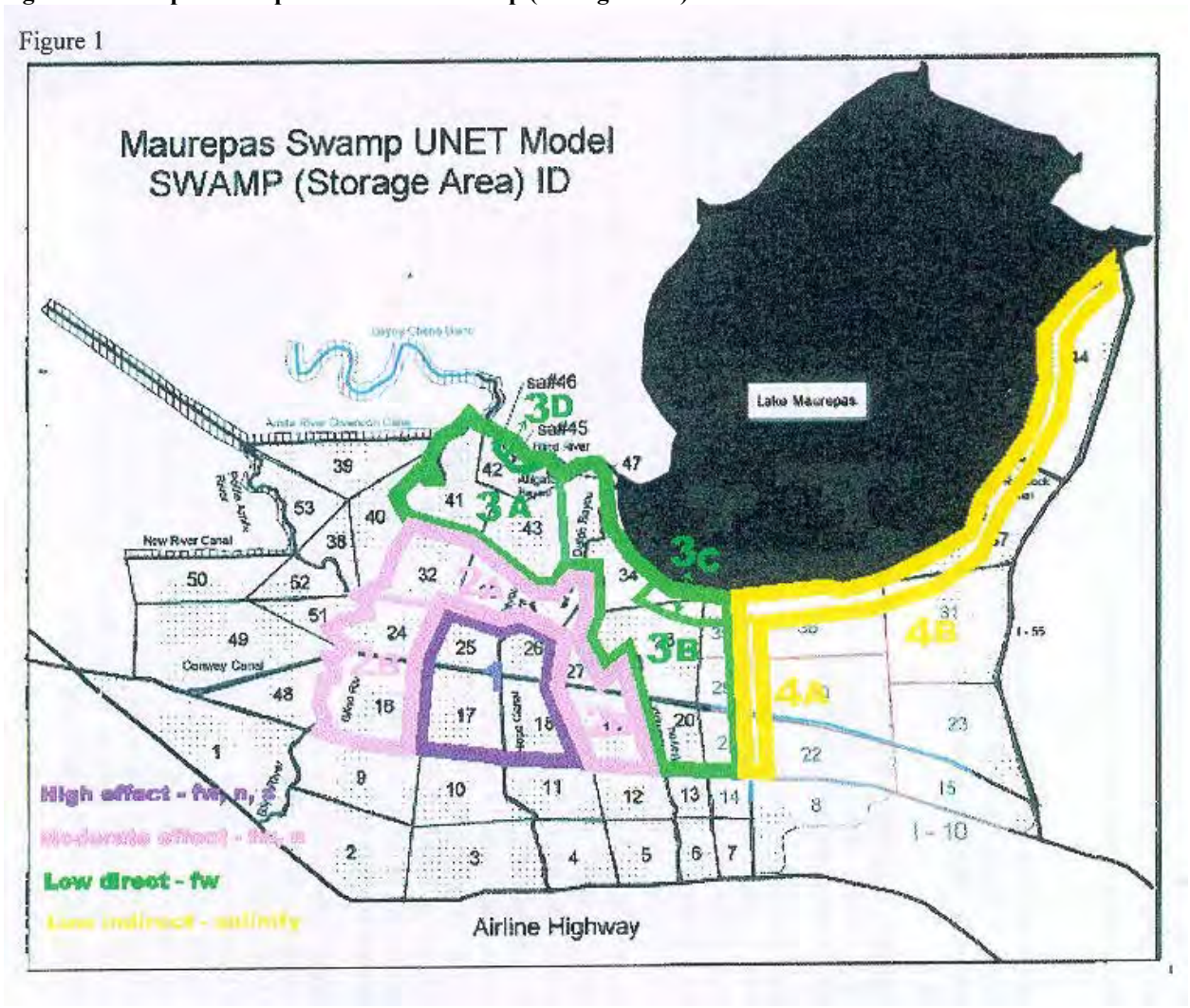
Alternative	Hydro Index (HI)	Floristic Quality Index (FQI)	Average of HI + FQI
Alternative A and C	0.864	0.197859	0.53093
Alternative D	0.769285714	0.184509	0.476898

Although this simplified approach is not ideal for assessing habitat quality, given the shortened study schedule and limitation on data gathering we felt this data driven approach is better than any other option explored. Once the TSP was selected the habitat evaluation team (HET) conducted full WVA analysis on the TSP.

Comparison to other projects

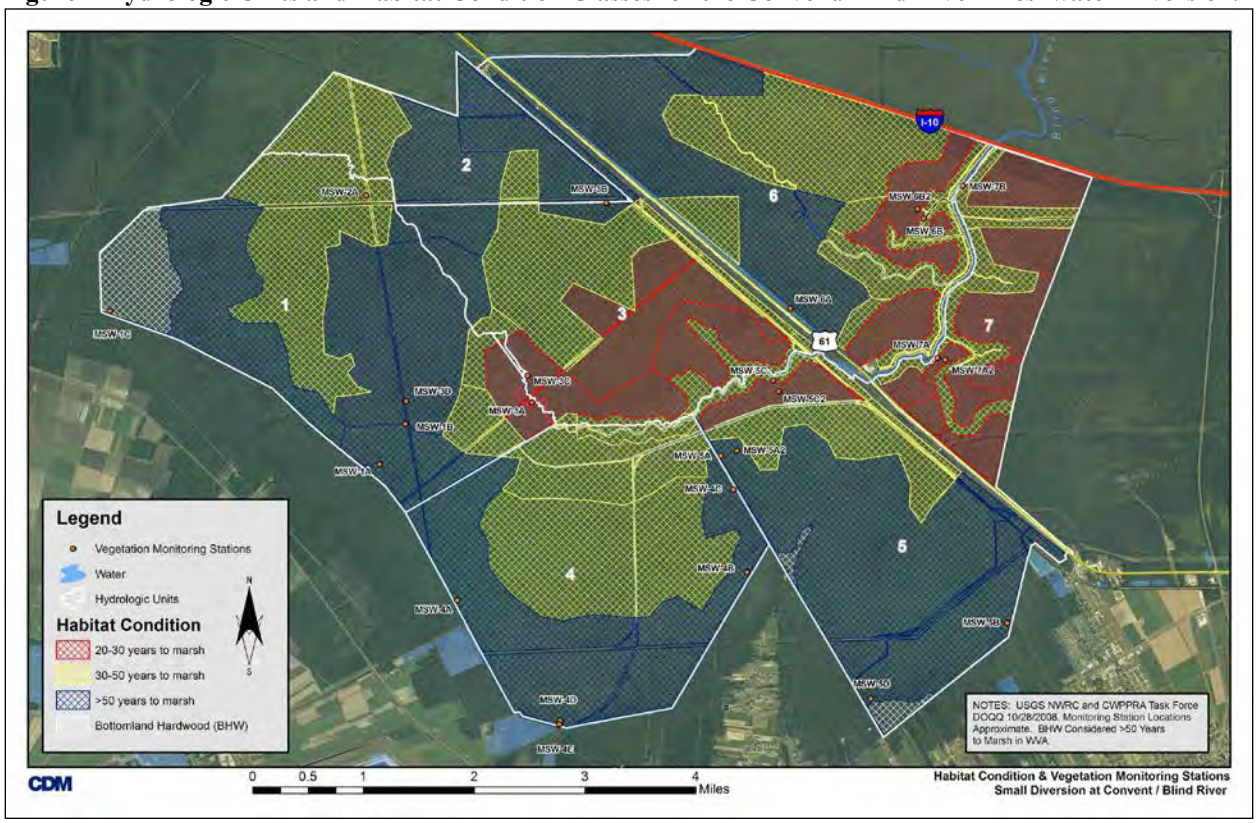
To further compare the numbers developed through the CRMS station HI and FQI with other nearby projects we looked at the following projects. These projects use HSI to represent habitat quality. HSIs are different from the CRMS HI and FQI in that the HSI look at several variables important for that habitat type, but both approaches try to indicate the quality of habitat.

Figure 1 Maurepas swamp UNET Model swamp (Storage Area) ID



From May 2001 Maurepas WVA North portion of the WSLP but within the project area
HSI for TY0.
Area 1 (purple): 0.57
Area 2A (pink): 0.47
Area 2B (pink): 0.44

Figure 2 Hydrologic Units and Habitat Condition Classes for the Convent/Blind River Freshwater Diversion.



Convent/Blind River WVA Moderate SLR located west portion of the WSLP.
HSI for TY0 of Alternative 2 (TSP) were:
20-30 years to swamp converts to marsh (red): 0.34
30-50yers swamp to marsh (yellow): 0.73
Greater than 50 years swamp to marsh (blue): 0.67

WETLAND VALUE ASSESSMENT MODEL

The Wetland Value Assessment (WVA) model, was developed under the Coastal Wetlands Planning, Protection, and Restoration program to determine benefits of proposed coastal wetland restoration projects. The 2011 version was used to assess direct and indirect impacts for project features proposed under Alignment C of this project. Further information on this model may be obtained from the U.S. Fish and Wildlife Service's Lafayette Louisiana Ecological Services Field Office (Phone: 337-291-3101).

The WVA is similar to the U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (HEP), in that habitat quality and quantity are measured for baseline conditions and predicted for future without-project and future with-project conditions. Separate models were used for cypress-tupelo swamp and Bottomland Hardwood. Instead of the species-based approach of

HEP, each WVA model utilizes an assemblage of variables considered important to the suitability of that habitat type for supporting a diversity of fish and wildlife species. As with HEP, the WVA allows a numeric comparison of each future condition and provides a quantitative estimate of project-related impacts to fish and wildlife resources.

The WVA models operate under the assumption that optimal conditions for fish and wildlife habitat within a given coastal wetland type can be characterized, and that existing or predicted conditions can be compared to that optimum to provide an index of habitat quality. Habitat quality is estimated and expressed through the use of a mathematical model developed specifically for each wetland type. Each model consists of: 1) a list of variables that are considered important in characterizing fish and wildlife habitat; 2) a Suitability Index graph for each variable, which defines the assumed relationship between habitat quality (Suitability Index) and different variable values; and 3) a mathematical formula that combines the Suitability Indices for each variable into a single value for wetland habitat quality, termed the Habitat Suitability Index (HSI). The WVA models assess the suitability of each habitat type for providing resting, foraging, breeding, and nursery habitat to a diverse assemblage of fish and wildlife species. This standardized, multi-species, habitat-based methodology facilitates the assessment of project-induced impacts on fish and wildlife resources.

HSI values are determined for each target year (TY). Target years, determined by the model user, represent significant changes in habitat quality or quantity were expected during the 50-year project life, under future with-project and future without-project conditions. In this study, target years of 0, 1, and 50 are evaluated for both future with project (FWP) and future without project (FWOP).

The product of an HSI value and the acreage of available habitat for a given target year is known as the Habitat Unit (HU). The HU is the basic unit for measuring project effects on fish and wildlife habitat. Future HUs change according to changes in habitat quality and/or quantity. Results are annualized over the project life to determine the Average Annual Habitat Units (AAHUs) available for each habitat type.

The change (increase or decrease) in AAHUs for each future with-project scenario, compared to future without-project conditions, provides a measure of anticipated impacts. A net gain in AAHUs indicates that the project is beneficial to the habitat being evaluated; a net loss of AAHUs indicates that the project is damaging to that habitat type. In determining future with-project conditions, all project-related direct (construction) impacts were assumed to occur in Target Year 1.

The WVA model for swamp consists four variables: 1) stand structure; 2) stand maturity; 3) water regime; and 4) mean high salinity during the growing season. The WVA model for BLH consists of seven variables: 1) tree species composition; 2) stand maturity; 3) understory/midstory; 4) hydrology; 5) size of contiguous forested area; 6) suitability and traversability of surrounding land uses; and 7) disturbance. Changes in each variable are predicted for future without-project and future with-project scenarios over a 50-year project life.

Given the tight feasibility study schedule, the Wetland Value Assessment (WVA) methodology was selected as the most appropriate for determining project benefits. Described below are the assumptions used to determine those swamp and BLH baseline, FWOP, and FWP projections for the proposed project area.

GENERAL ASSUMPTIONS

- Period of analysis is from 2020 (TY0) to 2070 (TY50).
- TY0 is baseline.
- Environmental modeling looked at direct and indirect impacts of Alignment C to 50 years.
- The latest (2011) version of Swamp and BLH WVAs were used for the impacts analysis.
- In accordance with the Corps EC-1165-2-212, RSLR was determined using the Lake Pontchartrain at West End USGS Gauge (gage number 85625) to determine base and future subsidence and sea level rise (SLR) levels and Relative SLR (RSLR).

Table 2. Relative sea level rise in the West Shore Lake Pontchartrain project area.

Year and SLR Scenario	SLR (NAVD88 feet)	RSLR (NAVD88 feet)
2020 Low SLR	0.06	0.30
2020 Intermediate SLR	0.10	0.34
2020 High SLR	0.23	0.47
2070 Low SLR	0.33	1.81
2070 Intermediate SLR	0.85	2.32
2070 High SLR	2.47	3.95

- The future without conditions from LCA Convent Blind river assumed no net vertical accretion. We assume the same since the WSLP is adjacent to the LCA Convet Blind River area. From the LCA Convent Blind River Feasibility Study – Page 5-35 Existing conditions would persist, including no net vertical accretion of soil deposition and continued subsidence over the 50-year period of analysis.
- Target Years for both FWOP and FWP include TY0, TY1, and TY50.
- The WSLP levee could create a financial incentive to develop in enclosed areas, including wetlands. Recent significant changes in the Federal flood insurance program (stemming from passage of the Biggert-Waters Flood Insurance Reform Act) will likely have the effect of establishing dramatically lower flood insurance rates in areas within 100-year or 1% levee systems relative to those without. This could create a significant financial incentive for development in protected areas, particularly as lower lying and less protected communities migrate to safer locations (as occurred after Katrina, particularly in St. Bernard Parish). Though induced development may occur we assume it does not for the purpose of this evaluation.

Data Collected from Site Visits and CRMS Stations

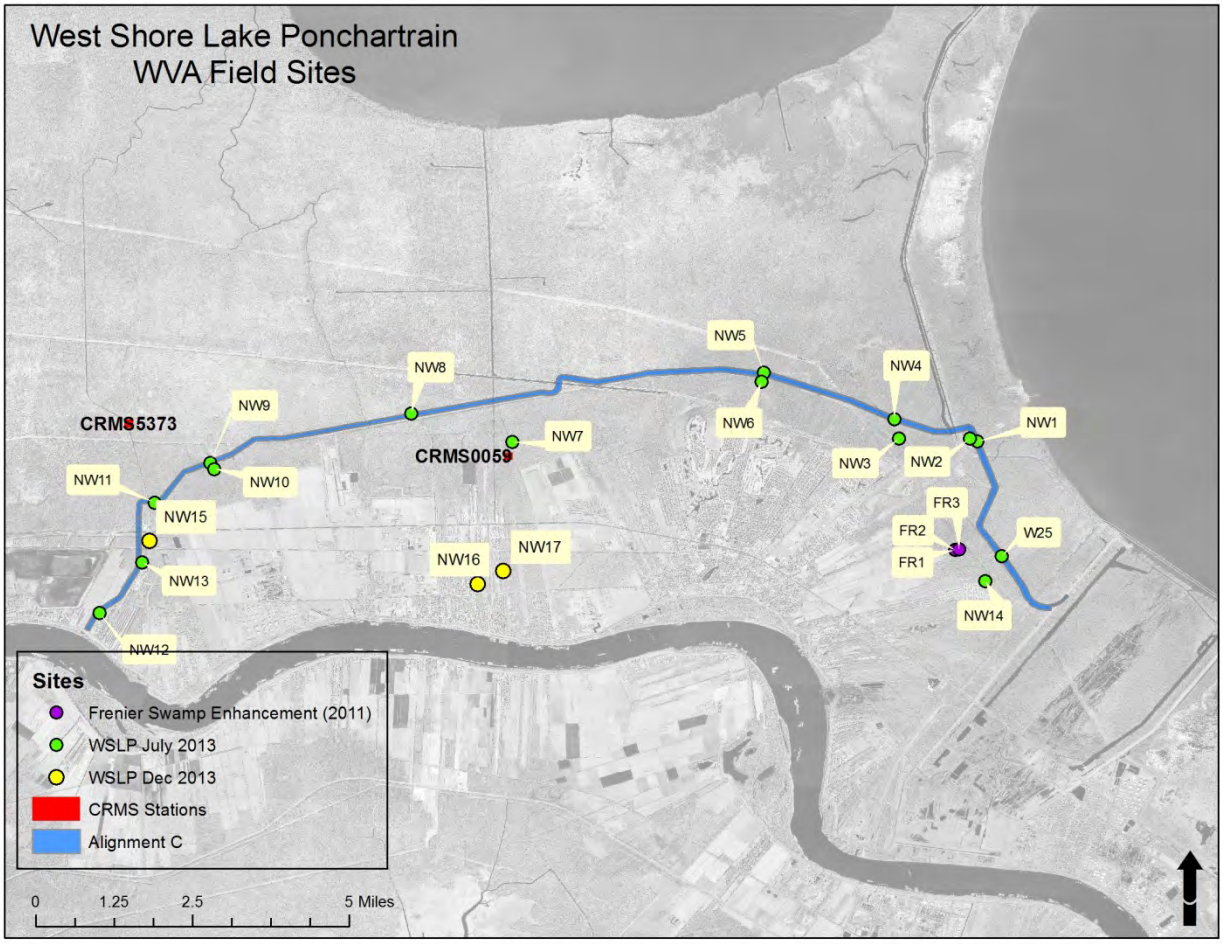
Baseline data was collected from several sites (March 2011, July 2013, and Dec 2013) and CRMS stations CRMS0059 (Reserve) and CRMS5373 (Hope). Sites were either on the proposed Alignment C (direct alignment) or interior to the alignment (indirect). See figure 3.

15 plots were visited on July 8-12, 2013, 3 of which are BLH and the rest are swamp sites. Data

was collected on three additional sites to better represent the Indirect BLH areas on Dec 2, 2013. Some were on the direct alignment and the rest were interior (between the developed area and the alignment. Three sites (visited for the Frenier Swamp Enhancement project) were previously visited in March 2011 for a potential mitigation site for the NOV HDSRRS project.

Figure 3 shows the sites visited for WVA analysis. Given the time constrains and the difficulty accessing many of the remote sites we obtained as many plots as feasible. Ideally many more plots would be preferred. Plots on the flood side of the alignment were thought not to be necessary as the project is not expected to have an impact to the flood-side swamp.

Figure 3. Wetland Value Assessment Plots and CRMS stations for "West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study" taken March 2011 and July 2013.



As we saw during the site visits from July 8 through 12, 2013 the areas in the east and central were generally more flooded than the areas to the west where it becomes BLH. This matches the data seen from the two CRMS sites. We assume that CRMS0059 (Reserve) will similar to sites W25, NW1 through NW8, NW14, and FR1, 2, 3. These are all sites in the middle and eastern portions of the direct and indirect areas. CRMS5373 (Hope) is has more similar conditions to NW9 and NW10. NW11-NW13 and NW15-NW17 are BLH sites. There are no nearby CRMS

stations that are similar to the BLH sites.

WVAs will be split into 3 sections: East, Central, and West (Figure 4) and again separated by direct (direct alignment footprint) and indirect (area between Alignment and the developed area) areas (Table 3). The data collected from W25, NW1 through NW4, NW14, and FR1, 2, 3 will be used to represent the Central and Easter portion of the direct and indirect areas. The plots (figure 3) on the direct alignment will be used for direct impacts assessment. The plots in the interior area from the 2013 site visit and the 2011 site visit will be used for the indirect impacts assessment. The CRMS0059 (Reserve) and CRMS5373 (Hope) are used where appropriate (Table 3). WVAs for each plot were developed individually then the WVAs were combined by area (listed above).

Figure 4. East, Central, and West areas for Alignment C of the "West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study"

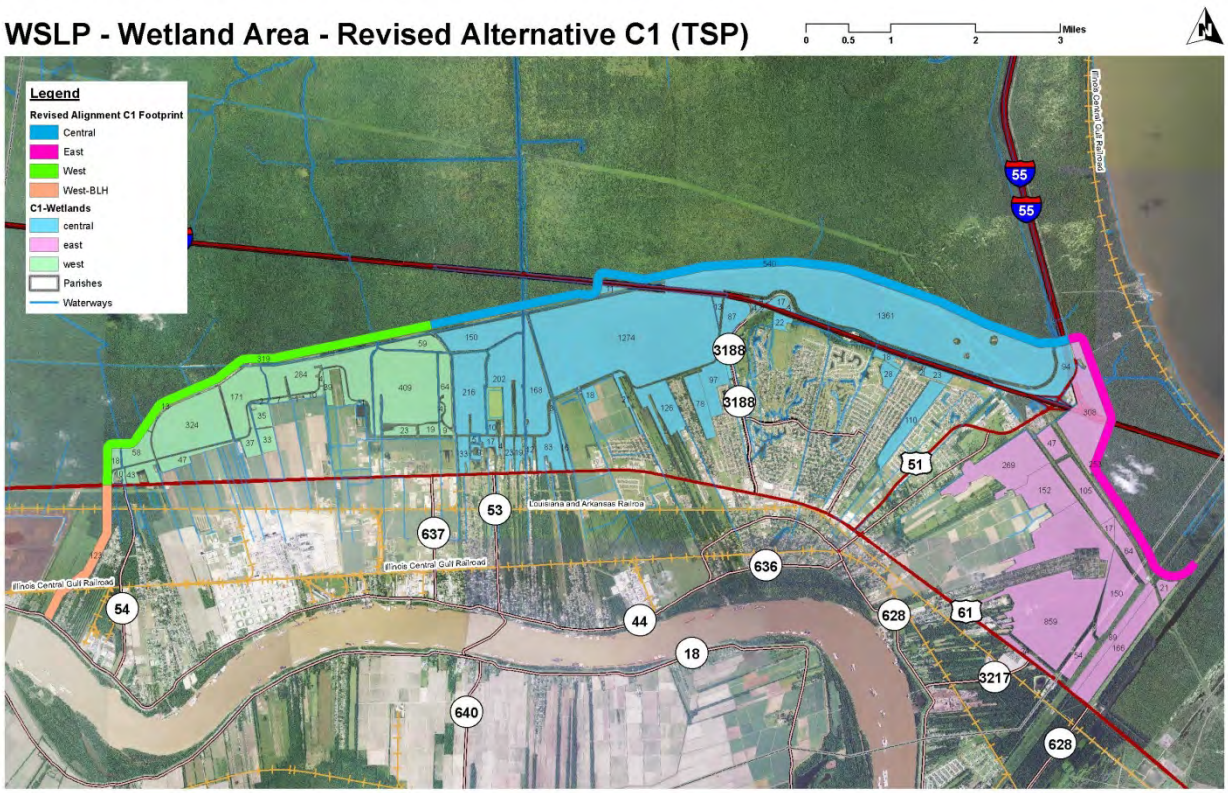


Table 3. Data from listed plots are used for baseline information in the Wetland Value Assessments.

		Acers	Field sites used
Direct swamp	East	253	W25, NW1
	Central	540	NW4, NW5, NW8
	West	319	NW9, CRMS5373
Total Direct swamp		**1112**	
Indirect Swamp	East	2325	NW2, NW14, FR1, FR2, FR3
	Central	4383	NW3, NW6, NW7, CRMS0059
	West	1724	NW10, CRMS5373
Total Indirect Swamp		**8432**	
Indirect BLH no impact		366	
Indirect BLH with impacts		89	NW15, NW16, NW17
Direct BLH		123	NW11, NW12, NW13
NonStructural Swamp		1.1	

SWAMP

Variable (V) 1 – Stand Structure:
Stand structure (V1) data was collected from all site visits and CRMS0059 (Reserve) and CRMS5373 (Hope).

Table 4. Wetland Value Assessment Swamp Model Variable 1 – Stand Structure.

	Overstory Closure		Scrub-shrub/ Midstory Cover		Herbaceous Cover
Class 1.	<33%				
Class 2.	≥33%<50%	and	<33%	and	<33%
Class 3.	≥33%<50%	and	≥33%	or	≥33%
Class 4.	≥50%<75%	and	≥33%	or	≥33%
Class 5.	≥33%<50%	and	≥33%	and	≥33%
Class 6.	≥50%	and	≥33%	and	≥33%
			OR		
	≥75%	and	≥33%	or	≥33%

Direct East Swamp
Baseline data indicates the stand structure is a Class 6 (Overstory 52%, Mid 48%, Under 45%). This area was last logged in 1956. The height of logging was in the 1920-1930s. Existing stands are currently around 70 years old. Therefore the Future conditions are expected to be lower than optimal at TY 50. Even though regeneration has been observed at present we cannot assume this will last into the future with about a 2 ft increase in RSLR for Low and Med and

about a 4ft increase for High RSLR. Based on this assumption and HET experience and best professional judgment, we reduce the class by 1 class with TY50 Low and Intermediate RSLR while we estimate TY50 High RSLR will drop by 2 classes.

FWOP
TY0 Class 6
TY1 Class 6
TY50 Class 5 Low
TY50 Class 5 Intermediate
TY50 Class 2 High

FWP
TY0 Class 6
TY1 none
TY50 none for low, intermediate, and high

Direct Central Swamp
Baseline data indicates the stand structure is a Class 6 (Overstory 68%, Mid 33%, Under 25%).

FWOP
TY0 Class 4
TY1 Class 4
TY50 Class 3 Low
TY50 Class 3 Intermediate
TY50 Class 1 High

FWP
TY0 Class 4
TY1 none
TY50 none for low, intermediate, and high

Direst West Swamp
Baseline data indicates the stand structure is a Class 3 (Overstory 39%, Mid 35%, Under 9%).

FWOP
TY0 Class 3
TY1 Class 3
TY50 Class 2 Low
TY50 Class 2 Intermediate
TY50 Class 1 High

FWP
TY0 Class 3
TY1 none
TY50 none for low, intermediate, and high

Indirect East Swamp
Baseline data indicates the stand structure is a Class 6 (Overstory 77%, Mid 52%, Under 52%).

FWOP
TY0 Class 6
TY1 Class 6
TY50 Class 5 Low
TY50 Class 5 Intermediate
TY50 Class 2 High

FWP
TY0 Class 6
TY1 Class 6
TY50 Class 4 low
TY50 Class 4 intermediate
TY50 Class 2 high

The area from the Bonnet Carre Spillway to the I-10 to I-55 exit is already hydrologically impacted by the railroad tracks and Fernier Road with only three drainage outlets. According to the RSLR shown in table 5 there is expected to be an increase of half a foot for Low and Intermediate RSLR and nearly 1 foot for High RSLR in the Indirect area when comparing the FWP to FWOP. Even with the existing restrictions with the addition of the new levee there will be a reduction in efficiency of drainage affecting water quality and increased impoundment on the protected side. Thus TY50 low and intermediate becomes class 4. High FWOP and FWP will be decreased to a class 2 with around 4 ft of RSLR.

Indirect Central Swamp
Baseline data indicates the stand structure is a Class 6 (Overstory 68%, Mid 45%, Under 61%).

FWOP
TY0 Class 6
TY1 Class 6
TY50 Class 5 Low
TY50 Class 5 Intermediate
TY50 Class 2 High

FWP
TY0 Class 6
TY1 Class 6
TY50 Class 4 low
TY50 Class 4 intermediate
TY50 Class 2 high

Assume a drop in one class from FWOP for low SLR due to changes in hydrology. Reduced efficiency of drainage due to levee will affect water quality and increase impoundment on the protected side. Thus TY50 low and intermediate becomes class 4. High FWOP and FWP will

be decreased to a class 2 with around 4 ft of RSLR.

Indirect West Swamp
Baseline data indicates the stand structure is a Class 3 (Overstory 32%, Mid 50%, Under 9%). Note: The swamp was in better condition than a Class 1 as would be indicated by the combination of one site visit (52% overstory cover) and the CRMS station (possible a low overstory, 11%, because it is right by the river where it may be atypical of the area). Based on observation we dropped the CRMS5373 (Hope) v1 data. Thus, the area would be a Class 3.

FWOP
TY0 Class 3
TY1 Class 3
TY50 Class 2 Low
TY50 Class 2 Intermediate
TY50 Class 1 High

FWP
TY0 Class 3
TY1 Class 3
TY50 Class 1 low
TY50 Class 1 intermediate
TY50 none high
(see reasoning above)

<u>V2 - Stand Maturity:</u>
Maturity (V2) stand data was collected from all site visits and both CRMS stations for baseline estimates. Projections for each site was processed through the WVA Site-Ingrowth spreadsheets. A growth factor for cypress was used to project tree growth of typical cypress swamp. The growth factor is based on a regression ($Y=-0.512X-0.1$, $R^2=$)1 derived from growth rates Visser, J.M. and C.E. Sasser,1995 and Mr. Bern Wood (Southeastern Louisiana University - SELU; working with Dr. Gary Shaffer) during a February 2010 verbal communication with the USFWS (Angela Trahan) - data was collected from Maurepas Swamp study sites. Assumed the maximum growth reduction factor occurs at a total of 4 feet of inundation, beyond which extreme tree stress and death would occur. RSLR rates were added to existing water depths (based on Lidar data) and then incorporated into the regression to obtain a change in growth rates for trees at each site. Most sites included indications of young tree recruitment. These trees were "grown-in" to each site. However with increased water levels for high SLR we assume there is no new/recruited tree growth.

In order to incorporate RSLR into the growth factor regression, the Service developed a simple spreadsheet in which the calculations are guided by the following assumptions:
1) there is a direct/ linear correlation between water depth and tree growth suppression
2) the maximum growth reduction factor is -2.15 (a more significant reduction factor would signify extreme tree stress and would equate to short-term tree death
3) the maximum growth reduction factor occurs at a total of 4 feet of inundation, beyond which

extreme tree stress and death would occur in less than 10 years (based on personal observations) 4) the minimum growth reduction factor (-0.1) occurs in areas where there are optimum hydrologic conditions (i.e., sufficient soil moisture, but no inundation)

This is an expedited best professional judgment for incorporating the relationship between RSLR and tree growth suppression.

Existing average water depths, based on water levels from LIDAR data and surface elevations (NAVD 88 feet), are +0.9 ft in the east and central areas and are +1ft (NAVD 88) in the west. CRMS stations indicated average water depths of +0.95 (CRMS0059-Reserve in the East and Central) and +1.2 (CRMS5373 (Hope) in the West). Though the CRMS data is similar, we assumed the LIDAR is more accurate as it includes representative sample over the entire indirect project area (283 points throughout the central and east and 57 points throughout the west) while the CRMS stations are limited to the station sites. Future projections of average water depths based on RSLR rates (Table 2) and existing water depths and the resulting growth rate correction factor are shown in Table 5. In addition the HET assumed the change in growth rate from FWOP to FWP was similar for Low and Intermediate RSLR (a change of 0.2) while the High had a greater difference between FWOP and FWP growth rates (a change of 1.0). This is based on the expected change in efficiency of drainage FWP (discussed above). Therefore the FWP growth rates for Med and High were adjusted to reflect this.

Table 5. Estimated water depth, based on water levels from LIDAR data and surface elevations, and Relative Sea Level Rise (NAVD88) and changes in tree growth factors based on these elevations.

EAST and Central	Existing Water Depth (ft NAVD88) (based on LIDAR)	Relative Sea Level Rise (ft NAVD88) (provided by the Corps)	Total Water Depth (ft NAVD88)	Baldcypress Growth Factor
FWOP Low	0.8775	1.81	2.69	-1.5
FWP Low	0.8775	2.21	3.09	-1.7
FWOP Med	0.8775	2.32	3.20	-1.7
FWP Med	0.8775	2.82	3.70	-1.9
FWOP High	0.8775	3.95	4.83	-2.6
FWP High	0.8775	4.85	5.73	-3.5
WEST				
FWOP Low	0.984	1.81	2.79	-1.5
FWP Low	0.984	2.21	3.19	-1.7
FWOP Med	0.984	2.32	3.30	-1.8
FWP Med	0.984	2.82	3.80	-2.0
FWOP High	0.984	3.95	4.93	-2.6
FWP High	0.984	4.85	5.83	-3.6

Direct East, Central, and West Swamp
FWOP Low, Med, and High RSLR

Table 6. Baseline (Target Year (TY) 1) and future without project (TY50) projections of diameter at breast height

(DBH) and basal area (BA) to indicate tree growth for the direct impact area in the West Shore Lake Pontchartrain Project including 3 levels of relative Sea Level Rise.

TOTAL Direct East Swamp				MED RSLR		High RSLR	
TY 1.0		FWOP (-1.5) TY50		FWOP (-1.7) TY50		FWOP (-2.6) TY50	
DBH	BA	DBH	BA	DBH	BA	DBH	BA
17.0	53.2	15.0	338.9	14.4	331.8	15.9	308.5
4.2	13.3	4.7	107.0	4.6	104.8	4.2	81.2
12.7	39.9	10.2	231.9	9.9	227.0	11.7	227.3

TOTAL Direct CENTRAl Swamp				MED RSLR		High RSLR	
TY 1.0		FWOP (-1.5) TY50		FWOP (-1.7) TY50		FWOP (-2.6) TY50	
DBH	BA	DBH	BA	DBH	BA	DBH	BA
15.0	205.5	13.9	421.6	12.9	380.3	12.5	233.0
7.5	102.7	6.2	189.0	5.8	170.5	6.8	127.1
7.5	102.7	7.7	232.6	7.1	209.8	5.9	110.1

TOTAL Direct West Swamp Low SLR				Med RSLR		High RSLR	
TY 1.0		FWOP (-1.5) TY50		FWOP (-1.8) TY50		FWOP (-2.6) TY50	
DBH	BA	DBH	BA	DBH	BA	DBH	BA
20.6	2876.2	22.6	4560.7	21.1	4160.7	20.6	3213.5
3.8	536.9	5.0	1001.8	4.6	913.9	3.9	609.1
16.8	2339.3	17.6	3558.9	16.4	3246.8	16.7	2604.4

TY1 will be the same as TY0.

FWP
TY0 same as above.
TY1-TY50 none or lowest value.

Indirect East, Central, and West Swamp
FWOP and FWP Low, Med, and High RSLR

Table 7. Baseline (Target Year (TY) 1) and future without and with project (TY50) projections of diameter at breast height (DBH) and basal area (BA) to indicate tree growth for the indirect impact area in the east, central, and western portion of the West Shore Lake Pontchartrain Project including 3 levels of relative Sea Level Rise.

TOTAL Indirect East Swamp Low RSLR		Low RSLR		Med RSLR		Med RSLR		High RSLR		High RSLR	
TY 1.0		FWOP (1.5) TY50		FWP (1.7) TY50		FWOP (1.7) TY50		FWP (1.9) TY50		FWOP (2.6) TY50		FWP (3.5) TY50	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
13.6	91.6	10.8	200.8	9.8	178.2	9.8	178.2	8.8	157.2	12.1	100.9	8.5	55.4
2.3	15.3	1.6	29.3	1.4	26.0	0.8	15.2	1.3	22.9	1.8	14.7	1.2	8.1
11.3	76.3	9.3	171.6	8.4	152.2	8.6	155.5	7.5	134.3	10.3	86.1	7.3	47.3

OTAL Indirect CENTRAL Swamp Low RSI		Low RSLR		Med RSLR		Med RSLR		High RSLR		High RSLR	
TY 1.0		FWOP (1.5) TY50		FWP (1.7) TY50		FWOP (1.7) TY50		FWP (1.9) TY50		FWOP (2.6) TY50		FWP (3.5) TY50	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
15.8	1083.8	14.2	2201.4	13.2	1970.9	13.2	1970.9	12.2	1774.8	12.2	1142.5	10.5	509.8
0.8	54.6	1.0	158.3	0.9	141.8	1.1	168.3	0.9	127.7	0.9	82.2	0.8	36.7
15.0	1029.2	13.2	2043.0	12.2	1829.1	11.5	1720.3	11.3	1647.1	11.3	1060.3	9.8	473.1
TOTAL Indirect West Swamp Low RSLR		Low RSLR		Med RSLR		Med RSLR		High RSLR		High RSLR	
TY 1.0		FWOP (1.5) TY50		FWP (1.7) TY50		FWOP (1.8) TY50		FWP (2.0) TY50		FWOP (2.6) TY50		FWP (3.6) TY50	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
21.3	2833.9	21.4	4503.8	20.4	4236.3	19.9	4106.7	18.9	3872.4	20.1	3172.2	15.8	2180.2
3.9	511.7	5.3	1107.1	5.0	1041.3	4.9	1009.5	4.7	951.9	4.9	779.7	3.9	535.9
17.5	2322.2	16.3	3421.9	15.5	3218.7	15.1	3120.2	14.4	2942.2	15.2	2410.1	12.0	1656.5

TY1 will be the same as TY0.

V3 – Water Regime:

CRMS stations were used to determine baseline water regime (V3) from water levels from 2008 to 2013 for direct and indirect area of Alignment C. There is drying mostly in the spring and summer depending on the year (Figure 6). Water levels and conditions in general appear to be slightly worse west of Alignment C which fits with the information determined above from CRMS FQI and HI and other projects nearby.

Table 8 shows the range of percent time that each CRMS site is flooded over the years 2008 through 2012 (this data for 2013 was unavailable at the time of this analysis). The max is nearly 90% of the time flooded at CRMS0059 (Reserve). CRMS5373 (Hope) floods as little as 42% of the time. On average CRMS0059 (Reserve) is flooded 20% more of the time than CRMS5373 (Hope).

Table 8. Percent of time flooded for two Coastwide Reference Monitoring Stations (CRMS) CRMS0059 **(Reserve)** and CRMS5373 **(Hope)** based on continuous hourly observations from 2008 to 2012 (2013 data was not available at the time of this analysis).

	Station		
Range	CRMS0059	CRMS5373	Both
min	64.40%	41.79%	41.79%
max	89.53%	71.20%	89.53%
avg	77.71%	54.14%	65.93%

More water fluctuation can be seen at CRMS5373 (Hope) than at CRMS0059 (Reserve) (Figure 5) though CRMS0059 (Reserve) seems to hold more water throughout the year than CRMS5373 (Hope) when compared from 2008 through 2012 for each site (Table 8).

Figure 5. Recent Water level range data for Coastwide Reference Monitoring Data (CRMS) station CRMS0059 (Reserve) **used to help determine baseline water levels and fluctuations in the eastern portion of West Shore Lake Pontchartrain Project.**

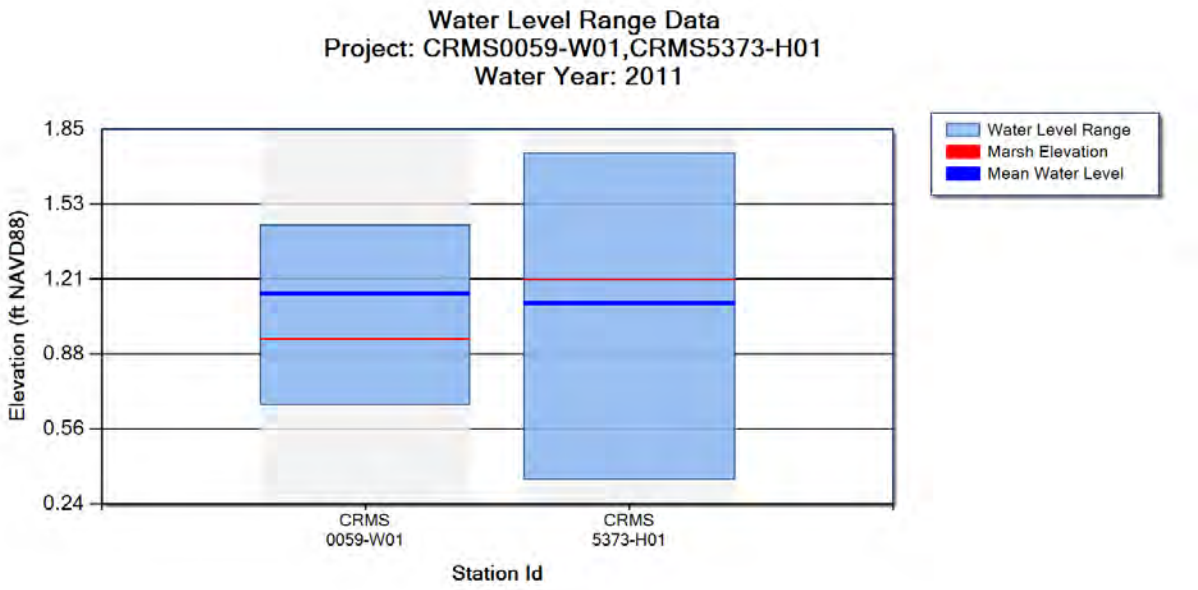
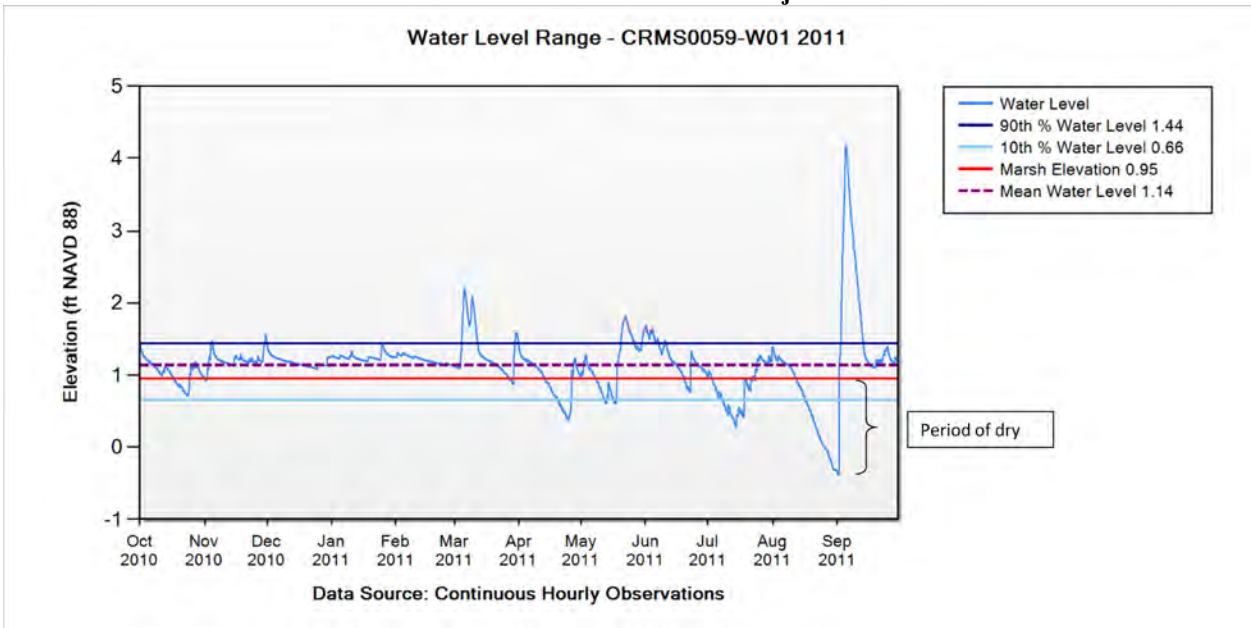
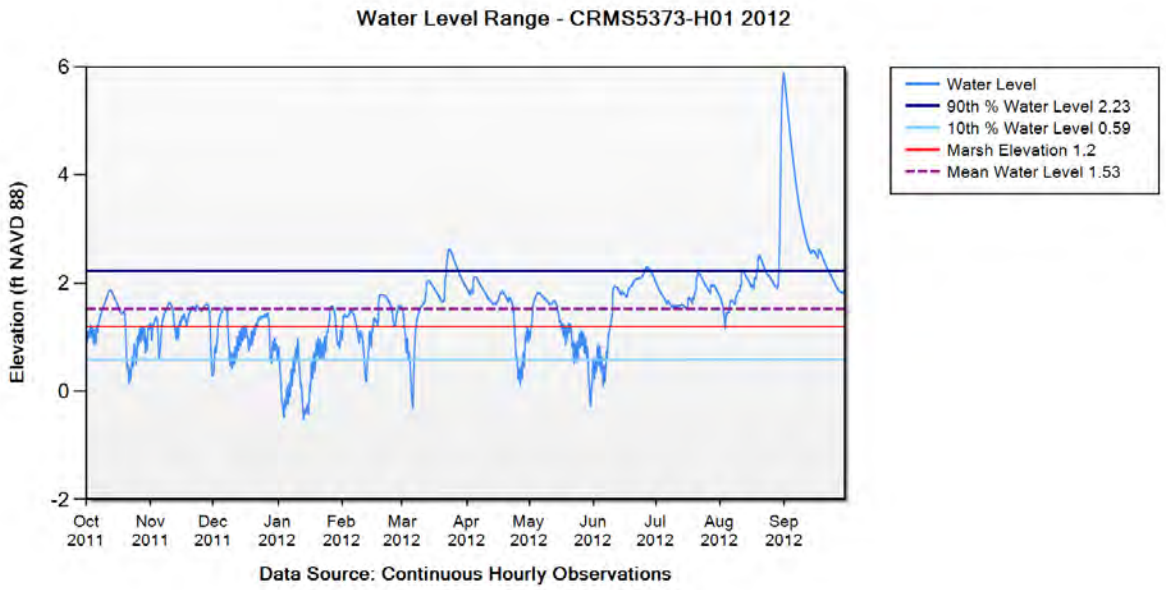
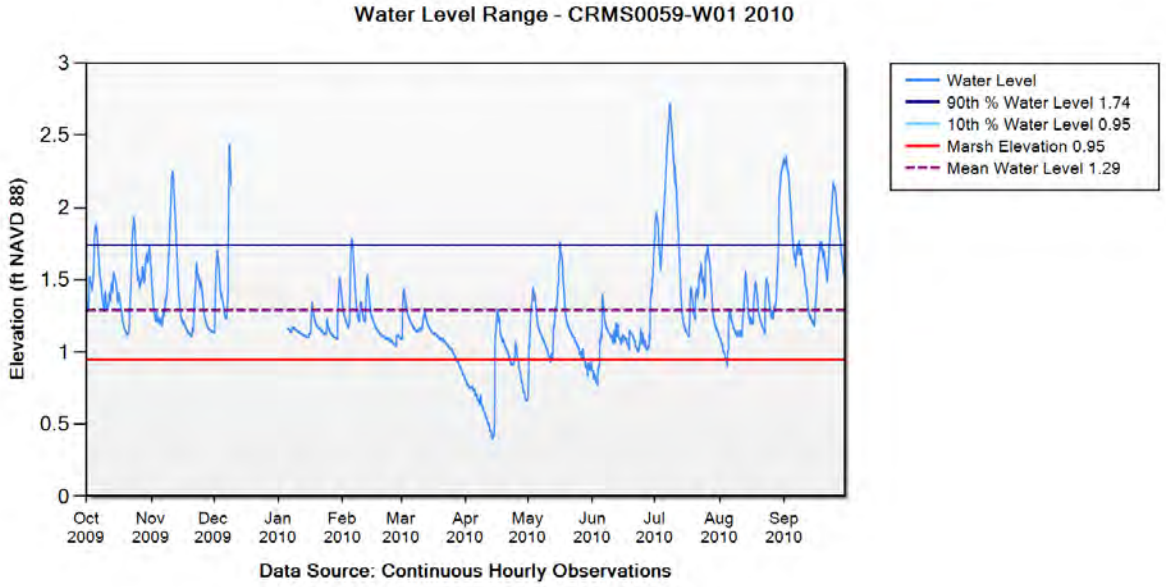


Figure 6 includes examples of the hourly water level range including swamp (refered to as marsh here) elevations. Swamp elevation is at 0.95 feet for CRMS0059 (Reserve) and 1.2 feet at CRMS5373 (Hope). Each year the amount of time water levels were below swamp elevations (dried conditions) varied from about 3 months to as much as 5 or 6 months of the year. CRMS0059 (Reserve) seemed to have less drying period than CRMS5737 which had more variation throughout the year. Below are representative years for water level from each site and representative ranges of fluctuations.

Figure 6. Examples of water level range representing various wet and dry years from Coastwide Reference Monitoring Data (CRMS) stations CRMS0059 (Reserve) **and CRMS5373** (Hope) **used to help determine baseline water levels and for the West Shore Lake Pontchartrain Project.**







Based on LIDAR data provided by the Corps the average water depth in the east and central is 0.9 ft (NAVD 88) and 1ft (NAVD 88) in the west. Swamp elevation is at 0.95 feet for CRMS0059 (Reserve) and 1.2 feet at CRMS5373 (Hope). Though the CRMS data is similar, we assumed the LIDAR is more accurate as it includes representative sample over the entire indirect project area (283 points throughout the east/central and 57 points throughout the west) while the CRMS stations are limited to the station sites. Future projections of average water depths based on RSLR rates (Table 2) and existing water depths are shown in table 5.

Table 9. Wetland Value Assessment Swamp Model Variable 3 – Water Regime.

		Flow/Exchange			
		High	Moderate	Low	None
Flooding Duration	Seasonal	1.00	0.85	0.70	0.50
	Temporary	0.9	0.75	0.65	0.40
	Semi-Permanent	0.75	0.65	0.45	0.25
	Permanent	0.65	0.45	0.30	0.10

We know from field access and aerial photography that there are several berms throughout the swamp. Thus we assume there are some restrictions to flow/exchange (moderate) in the central portion, and there is low exchange in the east and west due to the railroad and interstate, respectively.

Baseline (TY0) and TY1 water regime for Direct and Indirect Central (based on CRMS0059-Reserve) is determined to have Semi-Permanent flooding duration and moderate flow/exchange which is equivalent to an HSI of 0.65. Direct and Indirect East (also based on CRMS0059) is determined to have Semi-Permanent flooding duration and low flow/exchange (HSI 0.45) because the east is bound by the railroad tracks and Fernier Road with only three drainage outlets.

Review of the CRMS5373 (Hope) water level data indicates the area West is Seasonally flooded with a high exchange. However because this gage is adjacent to Blind River we assume the exchange may be inflated compared to the rest of Western area. In addition the western portion drainage is affected by the interstate which has designated openings. Therefore baseline water regime for Direct and Indirect West (based on CRMS5373-Hope) is determined to have Seasonal flooding with Low exchange which equates to an HSI of 0.70.

Future projections (TY50) for water regime are assumed to increase in water level and exchange based on the RSLR (Table 5). In the future without project for Low RSLR there is an expected increase in water level by 1.81 ft, Intermediate RSLR there will be an increase of 2.32 ft, and 3.95 ft is expected for high RSLR. Future with project has increases in water levels by 2.21 ft, 2.82 ft, and 4.85 ft, respectively.

FWOP projections for Direct and Indirect East, Central, and West Swamps are expected to increase by about 2 feet for Low and Intermediate RSLR and about 4 feet for High RSLR. For FWOP projections we assume the water regime changes to Permanently flooded for all areas. Central will have a High exchange, an HSI of 0.65 for all three RSLR, since that area is open and with RSLR water will exchange over existing interior berms. East and West will have a Low exchange assuming the existing railroad (east) and interstate (west) will be maintained with its existing openings (HSI 0.30).

FWP projections for Direct East, Central, and West Swamp will have no value for V3 water

regime because a levee will be in place of the swamp. For FWP V3 water regime, TY1-TY50 will go to the lowest value 0.1 (or 0 if allowed).

FWP projections for Indirect East, Central, and West Swamp will have a slightly higher increase of water level than FWOP. According to the table above there is expected to be an increase of half a foot for Low and Intermediate RSLR and nearly 1 foot for High RSLR in the Indirect area when comparing the FWP to FWOP. Therefore FWP V3 water regime projections for Low, Intermediate, and High RSLR will be Permanently flooded. For Low and Intermediate RSLR the exchange for east and west will remain Low (0.45 HSI) assuming existing infrastructure and drainage will be maintained. In Central for Low and Intermediate RSLR we assume the exchange is Moderate. This assumes there are enough openings for water exchange but accounts for delays (resulting in more standing water) in water movement. With High RSLR all areas will have Low exchange because there will be openings but the efficiency will be reduced due to high RSLR (0.3 HSI).

Note: For the purposes of this project, the HET assumed the trigger for structure closures would be under tropical storm events and the elevation trigger would be adjusted as sea level rises. Therefore, the project would not close the system more often due to higher day-to-day sea level rise impacts. However there is concerned for potential reduced future water exchange due to RSLR requiring increased structure closures. The frequency and duration of gate closures may increase due to area-wide stage increases caused by RSLR thereby leading to potential substantial affects to wetlands enclosed by the levee system. The HET agreed that if the sponsor/operator sees a higher level of sea level rise and starts to see day to day street flooding, they may want to change the operations to close the structures at high tides. A change in operations would be considered a separate project purpose and authorization, and would require a new NEPA documentation or a permit approval for this operation change. If a change in operation due to RSLR is realized, at present, it is unknown how water levels within the system would be managed so there is a potential for substantial additional indirect impacts to swamp and fish and wildlife resources to occur. These additional impacts would need to be evaluated and mitigated.

FWOP East All RSLR
TY50 0.30 perm/Low

FWOP Central All RSLR
TY50 0.65 perm/high

FWOP West All RSLR
TY50 0.30 perm/Low
We assume the interstate (in the western portion) and the railroad (in the eastern portion) will be maintained with the same existing openings.

East Direct FWP
TY0 and TY1 0.45 semi-perm/low
TY50 Low 0.0 none
TY50 Med 0.0 none
TY50 High 0.0 none

Central Direct FWP
TY0 and TY1 0.65 semi-perm/mod
TY50 Low 0.0 none
TY50 Med 0.0 none
TY50 High 0.0 none

West Direct FWP
TY0 and TY1 0.70 seas/low
TY50 Low 0.0 none
TY50 Med 0.0 none
TY50 High 0.0 none

East Indirect FWP
TY0 and TY1 0.45 semi-perm/low
TY50 Low 0.30 perm/low
TY50 Med 0.30 perm/low
TY50 High 0.30 perm/low

Central Indirect FWP
TY0 and TY1 0.65 semi-perm/mod
TY50 Low 0.45 perm/mod
TY50 Med 0.45 perm/mod
TY50 High 0.30 perm/low

West Indirect FWP
TY0 and TY1 0.70 seas/low
TY50 Low 0.30 perm/low
TY50 Med 0.30 perm/low
TY50 High 0.30 perm/low

V4 – Salinity

CRMS stations were used to determine baseline salinity (V4) from water levels from 2008 to 2013 for direct and indirect area of Alignment C. We used salinity data after 2008 to beter reflect changes resulting from the Mississippi River Gulf Outlet (MRGO) closure and other closure structures that were expected to reduce salinity in the Pontchartrain basin and the project area. Salinity was obtained from Coastwide Reference Monitoring System (CRMS) stations CRMS0059 (Reserve) and CRMS5373 (Hope) (available at http://www.lacoast.gov/crms) for years 2008 through 2013. See Figure 7 and Table 10.

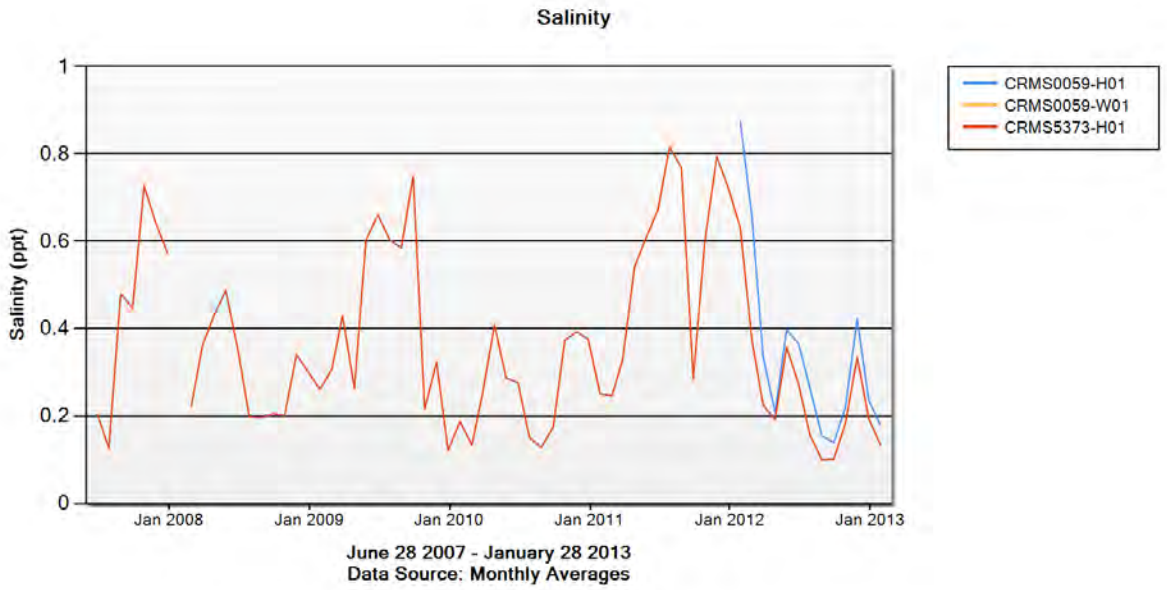
For swamp we use the mean high salinity which is from March through October. Salinity never reaches 1ppt from 2008 to 2013 and mostly is within the range of 0.2ppt-0.6ppt. The mean high salinity for March through October is 0.4ppt in the west and 0.3ppt in the east/central.

Table 10. Average annual and growing season salinity in parts per thousand (ppt) for two Coastwide Reference

Monitoring Stations (CRMS) CRMS0059 **(Reserve)** and CRMS5373**(Hope)**.

CRMS Station	CRMS0059	CRMS5373	Average for CRMS0059 and CRMS5373
avg annual Sal (ppt)	0.3	0.4	0.3
Avg growing Sal (ppt)	0.3	0.4	0.4

Figure 7. Salinity data from Coastwide Reference Monitoring Data (CRMS) stations CRMS0059 (Reserve) **and CRMS5373** (Hope) **used to help determine mean high salinity during the growing season (March 1 to October 31) for the West Shore Lake Pontchartrain Project.**



TY50 Low RSLR increase from 0.4ppt(west) or 0.3ppt(east and central) to 1ppt
Intermediate RSLR to 1.4ppt or 1.3ppt
High RSLR to 2.4ppt or 2.3ppt

BOTTOMLAND HARDWOODS

366 acres of bottomland hardwoods (BLH) were considered but taken out of the indirect impacts because they would not be influenced by the proposed action. The existing hydrologic conditions contiguous to these interior BLH would be greater than any potential impacts of the proposed action.

Hard mast producers include trees such as oaks, sweet pecan, other hickories. Soft mast and other edible seed producers include trees such as red maple, sugarberry, green ash, boxelder, common persimmon, sweetgum, honeylocust, red mulberry, American elm, cedar elm.

$\underline{V_1}$ – Tree Species Association

Class 1: Less than 25% of overstory canopy consists of mast or other edible-seed producing trees or more than 50% of soft mast present but no hard mast.

Class 2: 25% to 50% of overstory canopy consists of mast or other edible-seed producing trees, but hard mast producers constitute less than 10% of the canopy

Class 3: 25% to 50% of overstory canopy consists of mast or other edible-seed producing trees, and hard mast producers constitute more than 10% of the canopy.

Class 4: Greater than 50% of overstory canopy consists of mast or other edible-seed producing trees, but hard mast producers constitute less than 20% of the canopy.

Class 5: Greater than 50% of overstory canopy consists of mast or other edible-seed producing trees, and hard mast producers constitute more than 20% of the canopy.

Table 11. **Type of mast (hard or soft mast) produced at three Wetland Value Assessment Bottomland Hardwood Sites (BLH). Used to determine Variable 1-Tree Species Association for direct and indirect BLH areas.**

Type Mast Producing Tree	Direct BLH Site			
	NW11	NW12	NW13	Average
hard-mast	0	25	0	8
soft-mast	95	75	100	90
non-mast	5	0	0	2
	Class 4	Class 5	Class 4	Class 4

Type Mast Producing Tree	Indirect BLH Site			
	NW15	NW16	NW17	Average
hard-mast	30	50	60	47
soft-mast	70	50	40	53
non-mast	0	0	0	0
	Class 5	Class 5	Class 5	Class 5

DIRECT BLH

Baseline tree species association is a Class 4.

FWOP

TY0 and TY1 Class 4

TY50 Low Class 4 (maintains similar association)

TY50 Med Class 4

TY50 High Class 3 with increased RSLR we expect to see a reduction of BLH overstory (may convert more to swamp) with High SLR.

FWP

TY0 Class 4

TY50 Low, Med, and High will be the lowest value (Class 1 or 0) because it is replaced by levee.

INDIRECT

Baseline tree species association is a Class 5.

FWOP

TY0 and TY1 Class 5

TY50 Low Class 5 (maintains similar association)

TY50 Med Class 5

TY50 High Class 4 with increased RSLR we expect to see a reduction of BLH overstory (may convert more to swamp) with High SLR.

FWP
TY0 Class 5
TY50 Low Class 5 (maintains similar association)
TY50 Med Class 5
TY50 High Class 4 expect to see similar results to FWOP. Because of the location near developed areas and on the western portion of the indirect area we don't expect to see much change due to the project.

V2- Stand Maturity and V3 Undertory/Midstory

Table 12. Calculations used to determine direct and indirect Wetland Value Assessment Bottomland Hardwood variables V2-Stand Maturity by using diameter at breast height (DBH) and basal area (BA) to indicate tree growth and V3-Understory and Midstory percent cover for indirect and direct impacts for baseline (Target Year (TY) 1) and future projections (TY50) in the western portion of the West Shore Lake Pontchartrain Project area including future projections.

TOTAL Direct BLH Low RSLR				Med RSLR		High RSLR	
TY 1.0		FWOP (0.3) TY50		FWOP (0.1) TY50		FWOP (-0.1) TY50	
DBH	BA	DBH	BA	DBH	BA	DBH	BA
14.5	87.7	21.3	501.6	20.2	458.8	19.2	420.1
tot	22.0	tot	54.0	tot	54.0	tot	54.0
Forest % c	71.9						
Mid % cov	72.5						
Herb % co	51.7						

TOTAL Indirect BLH Low RSLR		Low RSLR		Med RSLR		Med RSLR		High RSLR		High RSLR	
TY 1.0		FWOP (0.3) TY50		FWP (0.1) TY50		FWOP (0.1) TY50		FWP (0.1) TY50		FWOP (0.1) TY50		FWP (0.3) TY50	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
15.9	163.9	22.0	786.7	20.9	724.6	20.9	724.6	19.9	665.5	19.9	665.5	18.9	609.2
tot	31.0	tot	77.0	tot	77.0	tot	77.0	tot	77.0	tot	77.0	tot	77.0
Forest % c	67.2												
Mid % cov	20.0												
Herb % co	35.0												

DIRECT
FWOP V3
TY0 and TY1 understory 52%, mid 73%
TY50 Low understory 60%, mid 80%
TY50 Med understory 70%, mid 80% (less overstory cover than Low so increase under and mid)
TY50 High under 10%, mid 20% (increased inundation prevents growth)

FWOP V2
The growth factor for the predominant trees in these BLH sites is a +0.3 (American elm, maples, American sycamore, honeylocust, and waterlocust dominated stands). For Med RSLR we

assumed a slight decrease in growth rate of these trees due to increase inundation but assumed BLH is maintained. Drainage near the levee is changed (hold more water) but due to the steep gradient near the Miss River the FWP and FWOP the difference between the two lag times would be greater causing a backwater conditions under FWP. For High RSLR we assumed majority of the BLH switched to trees species that grow more similar to cypress swamp (-0.1) which is surrounding this higher area.

FWP V2 and V3
No BLH in the project footprint.

INDIRECT
FWOP and FWP V3
TY0 and TY1 understory 35%, mid 20%
TY50 Low understory 45%, mid 30%
TY50 Med understory 55%, mid 30% (less overstory cover than Low so increase under and mid)
TY50 High under 10%, mid 20% (increased inundation prevents growth)

FWOP V2
Same as direct.

FWP V2
Slight decrease in growth rate for FWP compared to FWOP. See table 12.

V4- Hydrology
Table 13. Wetland Value Assessment Bottomland Hardwood Model Variable 4- Hydrology.

		Flow/Exchange			
		High	Moderate	Low	None
Flooding Duration	Temporary	1.00	0.85	0.70	0.50
	Seasonal	0.85	0.75	0.65	0.40
	Semi-Permanent	0.75	0.65	0.45	0.25
	Permanent/Dewatered	0.65	0.45	0.30	0.10[1]

Based on field inspection this area may receive some standing water but water table appears to lie below the surface for most of the season. Because it is higher elevation it drains well. There were several drainage ditches nearby to accommodate High water flow/exchange.

DIRECT
FWOP
TY0 and TY1 1.0 Temporarily flooded/ High exchange
TY50 Low 0.85 Seas/High
TY50 Med 0.75 Semi-perm/High

TY50 High 0.65 Perm/High

FWP
TY0 and TY1 1.0 Temp/High
TY50 Low 0.0 none
TY50 Med 0.0 none
TY50 High 0.0 none

INDIRECT
FWOP
TY0 and TY1 1.0 Temporarily flooded/ High exchange
TY50 Low 0.85 Seas/High
TY50 Med 0.75 Semi-perm/High
TY50 High 0.65 Perm/High

FWP
TY0 and TY1 1.0 Temp/High
TY50 Low 0.75 Seas/Mod
TY50 Med 0.65 Semi-perm/Mod
TY50 High 0.45 Perm/Mod

V5 – Size of Contiguous Forested Area
Class 1. 0 to 5 acres

Class 2. 5.1 to 20 acres

Class 3. 20.1 to 100 acres

Class 4. 100.1 to 500 acres

Class 5. > 500 acres

DIRECT
The alignment crosses two sections of continuous BLH. The first is about 155 acres and the portion nearest the river is about 27 acres. In this case we take a weighted average of the two areas. 155 acres (class 4 HSI=0.8) is about 85% and 27 acres (class 3 HSI=0.6) is 15%. The weighted average is an HSI of 0.77 (closest to a class 4). Rather than use a class we entered an HSI of 0.77 for baseline for this variable.

FWOP
TY0 and TY1 0.77 (or Class 4)
TY50 Low 0.77 (or Class 4)
TY50 Med 0.77 (or Class 4)
TY50 High 0.77 (or Class 4) no change expected for High SLR since forest will remain whether it's BLH or swamp

FWP
TY0 and TY1 0.77 (or Class 4)
TY50 Low 0.0 none

TY50 Med 0.0 none
TY50 High 0.0 none

INDIRECT

The indirect areas span in two areas. Each area of BLH (267.5 acres in the west and 187.5 acres more east for a total of 455 acres) makes up between 20 and 100 acres of contiguous forest. Though there are breaks in the areas there are at least 100 acres of connectivity in both areas. Thus Class 3 is used for the baseline.

FWOP and FWP

TY0 and TY1 Class 3 (no change is expected FWP for this variable)
TY50 Low Class 3
TY50 Med Class 3
TY50 High Class 3 no change expected for High SLR since forest will remain whether it's BLH or swamp

V6-Suitability and Traversability of Surrounding Land Uses

Based on a 0.5 mile buffer of the levee alignment, Table 14 shows the percent of each land use seen in the buffer and calculates a weighted average of land use that is used for the SI. The same will be applied to FWOP TY1 and TY50. We assume that FWOP TY50 is similar to existing conditions for development projections. Because of RSLR it is expected that the Agriculture area will become more inundated. In addition there is uncertainty with the National Flood Insurance (see bullet under General Assumptions above). For these reasons we assume the agricultural lands will less likely be developed without the proposed levee. Note this assumption applies to V6 (Land Use) and V7 (Disturbance) but are not the assumptions used to determine mitigation.

Table 14. Calculations used to determine the Direct and Indirect Baseline, Future Without Project (FWOP) Target Year (TY) 1, and FWOP TY50 components of the Variable 6-Suitability and Traversability of Surrounding Land Use of the Wetland Value Assessment Bottomland Hardwood Model for the West Shore Lake Pontchartrain project.

V6 DIRECT TY0 and FWOP TY1 and TY50	Percent	Weight Factor	Weight Percent
Wooded	34	1	33.72
Ag & Openwater	32	0.2	6.40
Nonhabitat	34	0	0.00
	100	**SI**	**0.40**

V6 INDIRECT (TY0) and FWOP TY1 and TY50	Percent	Weight Factor	Weight Percent
Wooded	29	1	28.72
Ag & Openwate	40	0.2	7.94
Nonhabitat	32	0	0.00
	100	**SI**	**0.37**

FWP TY1 will be similar to Baseline with the exception that the 56 acres of BLH within the Alignment footprint will become Nonhabitat (Table 15).

Table 15. Calculations used to determine the Direct and Indirect Future With Project (FWP) Target Year (TY)1 component of the Variable 6-Suitability and Traversability of Surrounding Land Use of the Wetland Value Assessment Bottomland Hardwood Model for the West Shore Lake Pontchartrain project.

V6 DIRECT FWP TY1	Percent	Weight Factor	Weight Percent
Wooded	29	1	28.52
Ag & Openwater	32	0.2	6.40
Nonhabitat	39	0	0.00
	100	**SI**	**0.35**

V6 INDIRECT FWP TY1	Percent	Weight Factor	Weight Percent
Wooded	19	1	18.79
Ag & Openwate	40	0.2	7.94
Nonhabitat	42	0	0.00
	100	**SI**	**0.27**

Assume FWP TY50 the levee (56ac) and Ag land (21%) will be developed and become Nonhabitat. This assumption is based on the Corps economics analysis that projects growth to occur in existing agricultural lands (Table 16).

Table 16. Calculations used to determine the Direct and Indirect Future With Project (FWP) Target Year (TY) 50 component of the Variable 6-Suitability and Traversability of Surrounding Land Use of the Wetland Value Assessment Bottomland Hardwood Model for the West Shore Lake Pontchartrain project.

V6 DIRECT FWP TY50	Percent	Weight Factor	Weight Percent
Wooded	29	1	28.52
Openwater	11	0.2	2.16
Nonhabitat	61	0	0.00
	100	**SI**	**0.31**

V6 INDIRECT FWP TY50	Percent	Weight Factor	Weight Percent
Wooded	19	1	18.79
Openwater	8	0.2	1.64
Nonhabitat	73	0	0.00
	100	**SI**	**0.20**

Assume future projections will be the same for Low, Med, and High RSLR.

V7 – Disturbance

The effect of disturbance is a factor of the distance to, and the type of, disturbance. For Baseline (TY0), FWOP and FWP TY1, and FWOP TY50 we use the weighted average in Table 17. We assume that FWOP TY50 is similar to existing conditions for development projections. Because of RSLR it is expected that the Agriculture area will become more inundated. In addition there is uncertainty with the National Flood Insurance (see bullet under General Assumptions above). For these reasons we assume without the proposed levee the area will less likely be developed. Note this assumption applies to V6 (Land Use) and V7 (Disturbance) but are not the assumptions used to determine mitigation.

Table 17. Calculations used to determine the Baseline, Future Without Project (FWOP) Target Year (TY) 1, and FWOP TY50 components of the Variable 7-Disturbance of the Wetland Value Assessment Bottomland Hardwood Model for the West Shore Lake Pontchartrain project.

V7-Disterbance DIRECT (Baseline TY0, TY1, and FWOP TY50)				
Class 2 - 50 to 500ft	Acres	Percent of total area	SI	% X SI
Ag land	63.0	0.23	0.65	0.15
Residental and Railroad	51.2	0.19	0.5	0.09
Rest	159.1	0.58	1	0.58
Tot 500Ft Buffer	273.2		**Wt Avg %**	**0.83**

V7-Disterbance INDIRECT (Baseline TY0, TY1, and FWOP TY50)				
50 to 500ft	Acres	of total area	SI	% X SI
Ag land	22.8	0.06	0.65	0.04
al and Railroad	99.5	0.25	0.5	0.13
Rest	271.8	0.69	1	0.69
Tot 500Ft	394.1		**Wt Avg %**	**0.85**

Assume FWP TY50 (Table 18) with the proposed levee, Ag land will be developed. This assumption is based on the Corps economics analysis that projects growth to occur in existing agricultural lands.

Table 18. Calculations used to determine the Future With Project (FWP) Target Year (TY) 50 component of the Variable 7-Disterbance of the Wetland Value Assessment Bottomland Hardwood Model for the West Shore Lake Pontchartrain project.

V7-Disterbance DIRECT (FWP TY50)				
Class 2 - 50 to 500ft	Acres	Percent of total area	SI	% X SI
Ag land	0.0	0.00	0.65	0.00
Residental and Railroad	114.1	0.42	0.5	0.21
Rest	159.1	0.58	1	0.58
Tot 500Ft Buffer	273.2		**Wt Avg %**	**0.79**

V7-Disterbance INDIRECT (FWP TY50)				
50 to 500ft	Acres	of total area	SI	% X SI
Ag land	0.0	0.00	0.65	0.00
al and Railroad	122.2	0.45	0.5	0.22
Rest	151.0	0.55	1	0.55
Tot 500Ft	273.2		**Wt Avg %**	**0.78**

WETLAND VALUE ASSESSMENT FOR NON-STRUCTURAL COMPONENT

Do to time constraints all Non-Structural existing conditions and FWOP conditions were taken from the "Louisiana Coastal Area – Small Freshwater Diversion at Convent/Blind River" (CBR project, U.S. FWS, 2010). This data was collected and analyzed in 2010. The CBR project covers a larger project area that includes the Non-Structural areas for WSLP.

In the Convent/Blind River project the project area was divided into areas of different habitat degradation. Three levels of habitat condition class were defined within the project area: 20-30 years-to-marsh, 30-50 years-to-marsh, and greater than 50-years-to-marsh. Data obtain from representative vegetation monitoring stations were then summarized according to each habitat class to get a representative value for each habitat class for the WVA. Because we can not accurately determine when these swamps will convert to marsh or open water, these habitat condition classifications are meant to define the level or rate of degradation and not necessarily the target years that the habitats will be removed from the habitat assessment or converted to marsh habitat. The WSLP project non-structural areas are in the greater than 50-years-to-marsh category, therefore this category was used to evaluate these impacts.

Variable V1 – Stand Structure

Existing – The greater than 50 years-to-marsh habitat class is characterized by having 64 percent canopy cover, 46 percent midstory, and 22 percent herbaceous or ground cover. Of the overstory canopy cover, 44 percent is tupelo and other species and 56 percent is cypress. While the percentage indicates an even distribution, the individual monitoring vegetation sites were dominated by either one or the other species. Basal area and percent canopy cover is considered optimal, or dense, with an average basal area of 247.81 ft²/ac. The midstory is also considered suitable; however, herbaceous cover is less than optimal likely due to lack of light penetration and nutrients.

FWOP – In comparison to other areas of the Maurepas swamp, this habitat class is considerably healthier and is expected to maintain a Class 4 stand structure through much of the FWOP life. By target year 50 conditions will begin to deteriorate and the canopy begins to thin.

Table 19. Future-without Project Stand Structure Conditions from the "Louisiana Coastal Area Area – Small Freshwater Diversion at Convent/Blind River" project.

FWOP																	
Habitat Condition	TY0				TY1	TY20				TY30				TY50			
Class	%O	%M	%H	Class	Class	%O	%M	%H	Class	%O	%M	%H	Class	%O	%M	%H	Class
>50 yrs. to marsh	64	46	22	4	4	50<75	>33	<33	4	50<75	>33	<33	4	33<50	<33	<33	2

FWP – The FWP will be reduced to the lowest value or zero where applicable. With the project habitat will be replaced with project features.

Variable V2 – Stand Maturity

Existing Conditions

Nine vegetation monitoring stations were identified that were representative of the greater-than 50 years-to-marsh class. Basal area averaged 247.81 ft²/acre. The average DBH measured 15.76 inches for cypress and 13.97 inches for tupelo and other canopy co-dominant species.

FWOP

Numerous bald cypress and tupelo growth rates have been documented in deep water swamp habitats and are summarized by Visser and Sasser (1995). For FWOP conditions we assumed mean annual growth rates documented by Dr. Shaffer (unpublished) (Table 20) for target years

1-20. These assumptions are similar to what was used for the LCA, Amite River Diversion Channel Modification project. Since subsidence, total sea level rise and associated stresses are expected to continue mean annual growth rates were reduced for target years 20-50.

Table 20. Cypress and Tupelo Annual Growth Rates FWOP from the "Louisiana Coastal Area Area – Small Freshwater Diversion at Convent/Blind River" project.

	Cypress (inches)	Tupelo et al (inches)
TY 0-20		
>50 yrs to marsh	0.15	0.1
TY 20-50		
>50 yrs to marsh	*0.064	0.08

*Visser and Sasser (1995)

Increase in basal area was estimated by species and habitat condition class by calculating and projecting the increase in basal area using the predicted growth rates and tree mortality. Percent composition of canopy trees in the FWOP was estimated based on best professional judgment of expected mortality of tupelo among the habitat condition classes taking into consideration assumptions made for the CWPPRA River Reintroduction into Maurepas Swamp Project. The CWPPRA River Reintroduction into Maurepas Swamp Project estimated that 50% of tupelo would die over the 20 year FWOP life, but that actual mortality of cypress would be minimal. Because habitat conditions within the Convent/Blind River project area are more favorable and are not at the same stage of degradation we assumed a reduced tupelo mortality rate for the first 20 years and for higher quality habitat condition classes (Table 22). Because tupelo is more flood tolerant highly degraded areas have become dominated by tupelo. Those areas have also experienced continued degradation as a result of seasonal salinity spikes and are seeing increased tupelo mortality and reduced vigor. In order to be conservative only tupelo mortality was assumed when determining FWOP mortality and projected project benefits because lower quality habitats were dominated by tupelo.

Table 21. Tupelo Mortality FWOP from the "Louisiana Coastal Area Area – Small Freshwater Diversion at Convent/Blind River" project.

	TY 20	*TY 50
>50 yrs to marsh	25%	25%

*percent mortality is of the TY 0 (existing) stand

Table 10. Future-without Project Stand Maturity Conditions from the "Louisiana Coastal Area Area – Small Freshwater Diversion at Convent/Blind River" project.

Future Without Project:

Habitat Condition Class	Level of Influence	AVERAGE DIAMETER (inches)					% Contribution by Number of Individuals				BASAL AREA (ft^2/ac)			
		Species Group	TY1	TY20	TY30	TY50	TY1	TY20	TY30	TY50	TY1	TY20	TY30	TY50
		baldcypress	16.66	19.51	20.15	21.43	41.51	48.62	48.62	58.67				
>50 years to marsh	FWOP	tupelo et al.	14.57	16.47	16.47	18.87	58.49	51.38	51.38	41.33	280.03	320.24	345.15	338.32

FWP – The FWP will be reduced to the lowest value or zero where applicable. With the project

habitat will be replaced with project features.

Variable V_3 – Water Regime

Existing
Hydrologic modeling for this project, as well as hydrologic investigations for the CWPPRA River Reintroduction into Maurepas Swamp project, has revealed that the Maurepas swamp floor elevations [i.e., 1.12 feet NAVD per the CWPPRA, Coastwide Reference Monitoring System (CRMS) station 5167] are often lower than Lake Maurepas bottom elevations. This results in swamp water levels and dry-out periods being dependent on the water levels in Lake Maurepas, and essentially, flooding is semi-permanent with low to very low water exchange and throughput.

Water exchange between the project area swamps and adjacent swamps is reduced to what the Blind River and other small tributaries can exchange across the embankments of the three transportation corridors (i.e., U.S. Interstate 10, U.S. Highway 61, and KCSRR). These embankments act as hydrologic barriers and reduce flow-through across the project area swamp. Within the project area interior drainage and hydrologic exchange has been altered by the construction of drainage canals and associated berms, pipeline and transmission line rights-of-way, and remnant logging infrastructure (i.e., roads, pull boat ditches, and temporary railroad track embankments). Historically, seasonal overbank flooding over the natural Mississippi River levees facilitated hydrologic exchange and freshwater input on average every three to five years. Today the only additional freshwater input is through rainwater runoff, and even those contributions can by-pass the wetland system through the many storm water drainage canals that direct floodwaters directly into Blind River and Lake Maurepas. The project area swamp habitat has been altered and disrupted to a point that adequate water exchange does not exist, and is considered to have low water exchange.

FWOP
Future without project conditions flood durations are expected to worsen as sea level rise and subsidence continues and storm water control projects continue to force storm water into an already flooded system. It is assumed that the entire project area swamp habitat will become permanently flooded and continue to have low flow exchange.

FWP – The FWP will be reduced to the lowest value or zero where applicable. With the project habitat will be replaced with project features.

Variable V_4 - Mean high salinity during the growing season.

For the CWPPRA River Reintroduction into Maurepas Swamp project the lowest existing salinities documented were 1.53 ppt for the “Hope” station group (EPA 2001). The Convent/Blind River Diversion project area is located further inland from the “Hope” station group and is landward of several hydrologic barriers (i.e., I-10, US 61, KCSRR), thereby being protecting from the higher salinity waters coming from the Gulf. Because of these barriers it is likely salinity levels remain relatively consistent throughout the project area and do not fluctuate within the project area. While salinity spikes still affect the project area through the hydrologic

connectivity of Blind River and other small tributaries, those salinity spikes are not representative of typical salinities and are not represented in this variable The area inland and west of U.S. Hwy 61 is slightly fresher (than areas east of U.S. Hwy 61) due to the hydrologic barriers impeding the salinity gradient and the contribution of freshwater run-off from the adjacent upland areas. For two CRMS stations located west of U.S. Hwy 61 and in the project area average salinities in the growing season were measured at 0.35 ppt (CRMS0039) and 0.53 ppt (CRMS5167).

Existing conditions for areas west of U.S. Hwy 61 are estimated using data from the two CRMS stations (0039 and 5167) within the area. It is likely that in the 50-year future without project life the area will experience a slight increase in salinities, but will still be within the optimal range. Project area salinities are greatly influenced by adjacent storm water and agricultural freshwater runoff, and hydrologic barriers prevent high saline waters from entering the swamps. Salinity will still be a detrimental factor to swamp sustainability in the form of seasonal and drought induced salinity spikes.

Modeling conducted for the closure of the MRGO at Bayou La Loutre showed that salinities would decrease within the adjacent marshes and associated waterways on the order of 1.0 to 3.0 ppt as a result of that closure (Draft IER 11 Tier 2 Pontchartrain 2009). Higher saline waters that commonly entered through the MRGO into the southern end of Lake Pontchartrain have been cut off as a result of that closure and the Lake Borgne surge barrier currently being constructed.

RESULTS

See Table 23 for a summary of resulting Annual Average Habitat Unit (AAHUs) for three RSLR scenarios of swamp and bottomland hardwood (BLH) direct alignment, indirect, and nonstructural direct impacts for the West Shore Lake Pontchartrain Project. Direct footprint impacts for intermediate RSLR include the loss of 1112 acres of swamp and 123 acres of BLH resulting in -595 AAHUs for swamp and -96 AAHUs for BLH. Interior (protected side) wetlands include 8432 acres of swamp and 89 acres of BLH that are indirectly impacted. Thus the indirect impacts result in -495 AAHUs for swamp and -3 AAHUs for BLH at the Intermediate level of RSLR. Non-Structural direct impacts include the loss of 1.1 acres of swamp, resulting in -0.3 AAHUs at Intermediate RSLR.

Table 11. Summary of Annual Average Habitat Units (AAHUs) for swamp and bottomland hardwood that are directly (levee footprint) or indirectly (wetlands interior/on the protected side) impacted by the proposed West Shore Lake Pontchartrain Project.

Summary Low WVA

WVA titles/groupings		Initial Acers	AAHUs
Direct swamp	East	253	-143.2
	Central	540	-298.2
	West	319	-166.2
Total Direct Swamp			**-607.6**
Indirect Swamp	East	2325	-75.3
	Central	4383	-300.0
	West	1724	-62.4
Total Indirect Swamp			**-437.7**
Direct BLH		123	-96.8
Indirect BLH with impacts		89	-3.0
Non-Structural Direct Swam		1	-0.4
		TOTAL	**-1145.1**

Summary Intermediate WVA

WVA titles/groupings		Initial Acers	AAHUs
Direct swamp	East	253	-142.2
	Central	540	-288.4
	West	319	-164.8
Total Direct Swamp			**-595.3**
Indirect Swamp	East	2325	-110.6
	Central	4383	-322.9
	West	1724	-60.9
Total Indirect Swamp			**-494.5**
Direct BLH		123	-95.5
Indirect BLH with impacts		89	-3.1
Non-Structural Direct		1	-0.3
		TOTAL	**-1188.4**

Summary High WVA

WVA titles/groupings		Initial Acers	AAHUs
Direct swamp	East	253	-117.6
	Central	540	-232.4
	West	319	-148.1
Total Direct Swamp			**-498.1**
Indirect Swamp	East	2325	-72.5
	Central	4383	-214.8
	West	1724	-0.3
Total Indirect Swamp			**-287.6**
Direct BLH		123	-89.7
Indirect BLH with impacts		89	-4.2
Non-Structural Direct		1	-0.4
		TOTAL	**-879.6**

LITERATURE CITED

Chabreck, R.H. 1972. Proceedings of the Coastal Marsh and Estuary Management Symposium: held at Louisiana State University, Baton Rouge, Louisiana, July 17-18, 1972

Cretini, K.F., Visser, J.M., Krauss, K.W.,and Steyer, G.D. (2012). Development and use of floristic quality index for coastal Louisiana marshes. Environmental Monitoring and Assessment 184:2389-2403.

Day, F.P. ,Jr. 1985. Tree growth rates in the periodically flooded Great Dismal Swamp, Castanea, 50:89-95 (as cited in the referenced Visser and Sasser 1995 publication

Delaune, R.D., and A. Jugsujinda. 2003. Denitrification potential in a Louisiana wetland receiving diverted Mississippi River water. Chemistry and Ecology. Vol. 16, Issue 6, pages 411-418.

Jarvis , J.C. 2010. Vertical accretion rates in coastal Louisiana: A review of the Scientific Literature. U.S. Army Engineer Research and Development Center Environmental Lab. Tech. Notes-10-5. August 2010.

Louisiana Office of Coastal Protection and Restoration. 2013. Coastwide Reference Monitoring System-Wetlands Monitoring Data. Retrieved from Strategic Online Natural Resource Information System (SONRIS) database. http://coastal.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=92 Accessed 09 May 2013.

Krauss, Ken W., J. A. Duberstein, T. W. Doyle, W. H. Conner, R. H. Day, L. W. Inabineette, and J. L. Whitbeck (2009). Site Condition, Structure, and Growth of Baldcypress Along Tida/Non-Tidal Salinity Gradients. Wetlands, Vol. 29, No. 2, June 2009, Pp. 505-519. The Society of Wetland Scientist.

Snedden, G.A., Cable, J.E., Swarzenshi, C., and E. Swenson. 2006. Sediment discharge Into a subsiding Louisiana deltaic estuary through a Mississippi River diversion, Estuarine, Coastal and Shelf Science (2006), doi:10.1016/j.ecss.2006.06.035.

Snedden, G.A., and Swenson, E.M., 2012, Hydrologic index development and application to selected Coastwide Reference Monitoring System sites and Coastal Wetlands Planning, Protection and Restoration Act projects: U.S. Geological Survey Open-File Report 2012–1122, 25 p.

U.S. Environmental Protection Agency (EPA). 2001. Wetland Value Assessment Revised Project Information Sheet: Diversions into the Swamps South of Lake Maurepas.

U.S. Fish and Wildlife Service 2010. Prepared for U.S. Army Corps of Engineers and La Department of Natural Resources. Wetland Value Assessment Project Information Sheet

Comparing Final Array of Alternatives for Louisiana Coastal Area – Small Freshwater Diversion at Convent/Blind River.

U.S. Army Corps of Engineers 2009. Draft Individual Environmental Report (IER) 11, Tier 2 Pontchartrain: Improved Protection on the Inner Harbor Navigation Canal, Orleans Parish, Louisiana.

Visser, J.M. and C.E. Sasser. 1995. Changes in tress species composition, structure and growth in a bald cypress - water tupelo swamp forest, 1980 - 1990. For.Ecol.Mgmt. 72:119-129

Summary Low WVA

WVA titles/groupings		Initial Acers	AAHUs
Direct swamp	East	253	-143.2
	Central	540	-298.2
	West	319	-166.2
Total Direct Swamp			**-607.6**
Indirect Swamp	East	2325	-75.3
	Central	4383	-300.0
	West	1724	-62.4
Total Indirect Swamp			**-437.7**
Direct BLH		123	-96.8
Indirect BLH with impacts		89	-3.0
Non-Structural Direct Swa		1	-0.4
		TOTAL	**-1145.1**

		Acers
Direct swamp	East	253
	Central	540
	West	319
Total Direct swamp		**1112**
Indirect Swamp	East	2325
	Central	4383
	West	1724
Total Indirect Swamp		**8432**
Indirect BLH no impact		366
Indirect BLH with impacts		89
Direct BLH		123
NonStructural Swamp		1.1

Summary Intermediate WVA

WVA titles/groupings		Initial Acers	AAHUs
Direct swamp	East	253	-142.2
	Central	540	-288.4
	West	319	-164.8
Total Direct Swamp			**-595.3**
Indirect Swamp	East	2325	-110.6
	Central	4383	-322.9
	West	1724	-60.9
Total Indirect Swamp			**-494.5**
Direct BLH		123	-95.5
Indirect BLH with impacts		89	-3.1
Non-Structural Direct		1	-0.3
		TOTAL	**-1188.4**

Summary High WVA

WVA titles/groupings		Initial Acers	AAHUs
Direct swamp	East	253	-117.6
	Central	540	-232.4
	West	319	-148.1
Total Direct Swamp			**-498.1**
Indirect Swamp	East	2325	-72.5
	Central	4383	-214.8
	West	1724	-0.3
Total Indirect Swamp			**-287.6**
Direct BLH		123	-89.7
Indirect BLH with impacts		89	-4.2
Non-Structural Direct		1	-0.4
		TOTAL	**-879.6**

Model Name Wetland Value Assessment - Brackish Marsh Community Model
Model Version
Date of Last Update March 10, 2010

Objective of Model The swamp model was developed to determine the suitability of swamp habitat in providing resting, foraging, and nesting habitat for a diverse assemblage of wildlife species. The model is generally applied to areas supporting or capable of supporting a canopy of woody vegetation which covers at least 33 percent of the area's surface, and with at least 60 percent of that canopy consisting of any combination of baldcypress, tupelogum, red maple, buttonbush, and/or planertree. If greater than 40 percent of the woody vegetation canopy consists of species such as oaks, hickories, American elm, green ash, sweetgum, sugarberry, boxelder, persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc., then a bottomland hardwood model should be applied.

Instructions Enter data in green cells. All green cells must contain values (including 0's) in order for the HSI calculation to compute for that year.
Always error check data following entry.
Click on variable name in column B for a brief description of the variable.
Intermediate Calculations are "over flow" calculations that were too long or complex to fit within one cell within the table.
Refer to WVA documents for model structure and background.

Notes Enter data in units noted.
All percentages should be entered as whole numbers between 0 and 100.
It is recommended that Microsoft Office Excel Version 2007 or higher be used.
Earlier versions may result in compatability issues or loss of some functions.

Color Coding Key:

Input
Calculation
Output

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct East Swamp LOW Project Area: 253.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		52.00		52.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		48.00		48.00		33.00	
		Herbaceous		Herbaceous		Herbaceous	
		45.00		45.00		33.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	5.00	0.80
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		4.00		4.00		5.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		13.00		13.00		107.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		13.00		13.00		10.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		40.00	0.31	40.00	0.31	232.00	0.57
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.45	Semi-Permanent	0.45	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.30	1.00	0.30	1.00	1.00	0.86
		HSI =	0.59	HSI =	0.59	HSI =	0.55

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	6.00	5.00
Tupelo/Cypress dbh		
0.05	0.05	0.07
0.05	0.05	0.07
1.00	1.00	0.80
Tupelo/Cypress Basal Area		
0.77	0.77	0.57
Water Regime		
0.00	0.00	0.00
0.45	0.45	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	0.80

Project: WSLP Direct East Swamp LOW Project Area: 253.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Direct East Swamp LOW Project Area: 253.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct East Swamp LOW Project Area: 253.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		52.00		0.00		0.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		48.00		0.00		0.00	
		Herbaceous		Herbaceous		Herbaceous	
		45.00		0.00		0.00	
		Class		Class		Class	
		6.00	1.00	1.00	0.10	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		4.00		0.00		0.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		13.00		0.00		0.00	

Intermediate Calculations		
Class		
0.00	1.00	1.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.00	0.00
0.05	0.00	0.00
1.00	0.00	0.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime		
Salinity		

Project: WSLP Direct East Swamp LOW FWP

Project Area: 253.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

Project: WSLP Direct East Swamp LOW FWP

Project Area: 253.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

AAHU CALCULATION

Project: WSLP Direct East Swamp LOW

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	253.00	0.59	148.18	
1.00	253.00	0.59	148.18	148.18
50.00	253.00	0.55	140.04	7061.38
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	7209.56
			AAHUs =	144.19

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	253.00	0.59	148.18	
1.00	0.00	0.00	0.00	49.39
50.00	0.00	0.00	0.00	0.00
Max TY=	50.00		Total CHUs =	49.39
			AAHUs =	0.99

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.99
B. Future Without Project AAHUs =	144.19
Net Change (FWP - FWOP) =	**-143.20**

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct East Swamp MED Project Area: 253.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		52.00		52.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		48.00		48.00		33.00	
		Herbaceous		Herbaceous		Herbaceous	
		45.00		45.00		33.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	5.00	0.80
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		4.00		4.00		5.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		13.00		13.00		105.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		13.00		13.00		10.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		40.00	0.31	40.00	0.31	227.00	0.57
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.45	Semi-Permanent	0.45	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.30	1.00	0.30	1.00	1.30	0.78
		HSI =	0.59	HSI =	0.59	HSI =	0.55

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	6.00	5.00
Tupelo/Cypress dbh		
0.05	0.05	0.07
0.05	0.05	0.07
1.00	1.00	0.80
Tupelo/Cypress Basal Area		
0.77	0.77	0.57
Water Regime		
0.00	0.00	0.00
0.45	0.45	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	0.68

Project: WSLP Direct East Swamp MED Project Area: 253.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Direct East Swamp MED Project Area: 253.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct East Swamp MED Project Area: 253.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		52.00		0.00		0.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		48.00		0.00		0.00	
		Herbaceous		Herbaceous		Herbaceous	
		45.00		0.00		0.00	
		Class		Class		Class	
		6.00	1.00	1.00	0.10	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		4.00		0.00		0.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		13.00		0.00		0.00	

Intermediate Calculations		
Class		
0.00	1.00	1.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.00	0.00
0.05	0.00	0.00
1.00	0.00	0.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Direct East Swamp MED FWP

Project Area: 253.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Direct East Swamp MED FWP

Project Area: 253.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Direct East Swamp MED

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	253.00	0.59	148.18	
1.00	253.00	0.59	148.18	148.18
50.00	253.00	0.55	137.93	7009.75
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	7157.93
			AAHUs =	143.16

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	253.00	0.59	148.18	
1.00	0.00	0.00	0.00	49.39
50.00	0.00	0.00	0.00	0.00
Max TY=	50.00		Total CHUs =	49.39
			AAHUs =	0.99

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.99
B. Future Without Project AAHUs =	143.16
Net Change (FWP - FWOP) =	-142.17

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct East Swamp HIGH Project Area: 253.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		52.00		52.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		48.00		48.00		30.00	
		Herbaceous		Herbaceous		Herbaceous	
		45.00		45.00		30.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	2.00	0.20
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		4.00		4.00		4.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		13.00		13.00		81.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		13.00		13.00		12.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		40.00	0.31	40.00	0.31	227.00	0.75
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.45	Semi-Permanent	0.45	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.30	1.00	0.30	1.00	2.30	0.39
		HSI =	0.59	HSI =	0.59	HSI =	0.35

Intermediate Calculations		
Class		
0.00	0.00	2.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	6.00	0.00
Tupelo/Cypress dbh		
0.05	0.05	0.05
0.05	0.05	0.05
1.00	1.00	1.00
Tupelo/Cypress Basal Area		
0.77	0.77	0.75
Water Regime		
0.00	0.00	0.00
0.45	0.45	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	0.68
1.00	1.00	0.28

Project: WSLP Direct East Swamp HIGH Project Area: 253.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Direct East Swamp HIGH Project Area: 253.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct East Swamp HIGH Project Area: 253.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		52.00		0.00		0.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		48.00		0.00		0.00	
		Herbaceous		Herbaceous		Herbaceous	
		45.00		0.00		0.00	
		Class		Class		Class	
		6.00	1.00	1.00	0.10	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		4.00		0.00		0.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		13.00		0.00		0.00	

Intermediate Calculations		
Class		
0.00	1.00	1.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.00	0.00
0.05	0.00	0.00
1.00	0.00	0.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime		
Salinity		

Project: WSLP Direct East Swamp HIGH FWP

Project Area: 253.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

Project: WSLP Direct East Swamp HIGH FWP

Project Area: 253.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

AAHU CALCULATION

Project: WSLP Direct East Swamp HIGH

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	253.00	0.59	148.18	
1.00	253.00	0.59	148.18	148.18
50.00	253.00	0.35	87.74	5780.13
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	5928.32
			AAHUs =	118.57

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	253.00	0.59	148.18	
1.00	0.00	0.00	0.00	49.39
50.00	0.00	0.00	0.00	0.00
Max TY=	50.00		Total CHUs =	49.39
			AAHUs =	0.99

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.99
B. Future Without Project AAHUs =	118.57
Net Change (FWP - FWOP) =	-117.58

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct CENTRAL Swamp LOW Project Area: 540.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		68.00		68.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		33.00		33.00		33.00	
		Herbaceous		Herbaceous		Herbaceous	
		25.00		25.00		25.00	
		Class		Class		Class	
		4.00	0.60	4.00	0.60	3.00	0.40
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		8.00		8.00		6.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		103.00		103.00		189.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		8.00		8.00		8.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		103.00	0.40	103.00	0.40	233.00	0.37
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Moderate		Moderate		High	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.65	Semi-Permanent	0.65	Permanent	0.65
V4	Salinity	Salinity		Salinity		Salinity	
		0.30	1.00	0.30	1.00	1.00	0.89
		HSI =	0.60	HSI =	0.60	HSI =	0.51

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	3.00
4.00	4.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.20	0.20	0.08
0.20	0.20	0.08
0.60	0.60	0.60
Tupelo/Cypress Basal Area		
0.40	0.40	0.37
Water Regime		
0.00	0.00	0.65
0.65	0.65	0.00
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	0.80

Project: WSLP Direct CENTRAL Swamp LOW Project Area: 540.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Direct CENTRAL Swamp LOW Project Area: 540.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct CENTRAL Swamp LOW Project Area: 540.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		68.00		0.00		0.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		33.00		0.00		0.00	
		Herbaceous		Herbaceous		Herbaceous	
		25.00		0.00		0.00	
		Class		Class		Class	
		4.00	0.60	1.00	0.10	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		8.00		0.00		0.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		103.00		0.00		0.00	

Intermediate Calculations		
Class		
0.00	1.00	1.00
0.00	0.00	0.00
4.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.20	0.00	0.00
0.20	0.00	0.00
0.60	0.00	0.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Direct CENTRAL Swamp LOW FWP

Project Area: 540.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Direct CENTRAL Swamp LOW FWP

Project Area: 540.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Direct CENTRAL Swamp LOW

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	540.00	0.60	323.76	
1.00	540.00	0.60	323.76	323.76
50.00	540.00	0.51	275.97	14693.42
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	15017.19
			AAHUs =	300.34

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	540.00	0.60	323.76	
1.00	0.00	0.00	0.00	107.92
50.00	0.00	0.00	0.00	0.00
Max TY=	50.00		Total CHUs =	107.92
			AAHUs =	2.16

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	2.16
B. Future Without Project AAHUs =	300.34
Net Change (FWP - FWOP) =	-298.19

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct CENTRAL Swamp MED Project Area: 540.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		68.00		68.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		33.00		33.00		33.00	
		Herbaceous		Herbaceous		Herbaceous	
		25.00		25.00		25.00	
		Class		Class		Class	
		4.00	0.60	4.00	0.60	3.00	0.40
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		8.00		8.00		6.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		103.00		103.00		171.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		8.00		8.00		7.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		103.00	0.40	103.00	0.40	210.00	0.29
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Moderate		Moderate		High	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.65	Semi-Permanent	0.65	Permanent	0.65
V4	Salinity	Salinity		Salinity		Salinity	
		0.30	1.00	0.30	1.00	1.30	0.82
		HSI =	0.60	HSI =	0.60	HSI =	0.47

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	3.00
4.00	4.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.20	0.20	0.08
0.20	0.20	0.08
0.60	0.60	0.45
Tupelo/Cypress Basal Area		
0.40	0.40	0.29
Water Regime		
0.00	0.00	0.65
0.65	0.65	0.00
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	0.68

Project: WSLP Direct CENTRAL Swamp MED Project Area: 540.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Direct CENTRAL Swamp MED Project Area: 540.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct CENTRAL Swamp MED Project Area: 540.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		68.00		0.00		0.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		33.00		0.00		0.00	
		Herbaceous		Herbaceous		Herbaceous	
		25.00		0.00		0.00	
		Class		Class		Class	
		4.00	0.60	1.00	0.10	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		8.00		0.00		0.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		103.00		0.00		0.00	

Intermediate Calculations		
Class		
0.00	1.00	1.00
0.00	0.00	0.00
4.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.20	0.00	0.00
0.20	0.00	0.00
0.60	0.00	0.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Direct CENTRAL Swamp MED FWP

Project Area: 540.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Direct CENTRAL Swamp MED FWP

Project Area: 540.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Direct CENTRAL Swamp MED

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	540.00	0.60	323.76	
1.00	540.00	0.60	323.76	323.76
50.00	540.00	0.47	255.90	14201.67
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	14525.43
			AAHUs =	290.51

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	540.00	0.60	323.76	
1.00	0.00	0.00	0.00	107.92
50.00	0.00	0.00	0.00	0.00
Max TY=	50.00		Total CHUs =	107.92
			AAHUs =	2.16

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	2.16
B. Future Without Project AAHUs =	290.51
Net Change (FWP - FWOP) =	-288.35

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct Central Swamp HIGH Project Area: 540.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		68.00		68.00		30.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		33.00		33.00		33.00	
		Herbaceous		Herbaceous		Herbaceous	
		25.00		25.00		25.00	
		Class		Class		Class	
		4.00	0.60	4.00	0.60	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		8.00		8.00		7.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		103.00		103.00		127.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		8.00		8.00		6.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		103.00	0.40	103.00	0.40	110.00	0.19
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Moderate		Moderate		High	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.65	Semi-Permanent	0.65	Permanent	0.65
V4	Salinity	Salinity		Salinity		Salinity	
		0.30	1.00	0.30	1.00	2.30	0.49
		HSI =	0.60	HSI =	0.60	HSI =	0.26

Intermediate Calculations		
Class		
0.00	0.00	1.00
0.00	0.00	0.00
4.00	4.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.20	0.20	0.10
0.20	0.20	0.10
0.60	0.60	0.30
Tupelo/Cypress Basal Area		
0.40	0.40	0.19
Water Regime		
0.00	0.00	0.65
0.65	0.65	0.00
0.00	0.00	0.00
Salinity		
1.00	1.00	0.68
1.00	1.00	0.28

Project: WSLP Direct Central Swamp HIGH Project Area: 540.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Direct Central Swamp HIGH Project Area: 540.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct Central Swamp HIGH Project Area: 540.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		68.00		0.00		0.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		33.00		0.00		0.00	
		Herbaceous		Herbaceous		Herbaceous	
		25.00		0.00		0.00	
		Class		Class		Class	
		4.00	0.60	1.00	0.10	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		8.00		0.00		0.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		103.00		0.00		0.00	

Intermediate Calculations		
Class		
0.00	1.00	1.00
0.00	0.00	0.00
4.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.20	0.00	0.00
0.20	0.00	0.00
0.60	0.00	0.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Direct Central Swamp HIGH FWP

Project Area: 540.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Direct Central Swamp HIGH FWP

Project Area: 540.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Direct Central Swamp HIGH

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	540.00	0.60	323.76	
1.00	540.00	0.60	323.76	323.76
50.00	540.00	0.26	141.80	11406.22
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	11729.98
			AAHUs =	234.60

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	540.00	0.60	323.76	
1.00	0.00	0.00	0.00	107.92
50.00	0.00	0.00	0.00	0.00
Max TY=	50.00		Total CHUs =	107.92
			AAHUs =	2.16

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	2.16
B. Future Without Project AAHUs =	234.60
Net Change (FWP - FWOP) =	-232.44

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct West Swamp LOW Project Area: 319.00

Condition: Future Without Project

Variable		TY Class/Value	0.00 SI	TY Class/Value	1.00 SI	TY Class/Value	50.00 SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		39.00		39.00		39.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		35.00		35.00		30.00	
		Herbaceous		Herbaceous		Herbaceous	
		9.00		9.00		20.00	
		Class		Class		Class	
		3.00	0.40	3.00	0.40	2.00	0.20
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		4.00		4.00		5.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		537.00		537.00		1002.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		17.00		17.00		18.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		2339.00	0.82	2339.00	0.82	3559.00	0.79
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Seasonal	0.70	Seasonal	0.70	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.40	1.00	0.40	1.00	1.00	0.84
		HSI =	0.65	HSI =	0.65	HSI =	0.40

Intermediate Calculations		
Class		
0.00	0.00	2.00
3.00	3.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.05	0.07
0.05	0.05	0.07
1.00	1.00	1.00
Tupelo/Cypress Basal Area		
0.82	0.82	0.79
Water Regime		
0.00	0.00	0.00
0.70	0.70	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	0.80

Project: WSLP Direct West Swamp LOW Project Area: 319.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Direct West Swamp LOW Project Area: 319.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct West Swamp LOW Project Area: 319.00

Condition: Future With Project

Variable		TY Class/Value	0.00 SI	TY Class/Value	1.00 SI	TY Class/Value	50.00 SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		39.00		0.00		0.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		35.00		0.00		0.00	
		Herbaceous		Herbaceous		Herbaceous	
		9.00		0.00		0.00	
		Class		Class		Class	
		3.00	0.40	1.00	0.10	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		4.00		0.00		0.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		537.00		0.00		0.00	

Intermediate Calculations		
Class		
0.00	1.00	1.00
3.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.00	0.00
0.05	0.00	0.00
1.00	0.00	0.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Direct West Swamp LOW FWP

Project Area: 319.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Direct West Swamp LOW FWP

Project Area: 319.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Direct West Swamp LOW

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	319.00	0.65	207.37	
1.00	319.00	0.65	207.37	207.37
50.00	319.00	0.40	126.25	8173.72
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	8381.08
			AAHUs =	167.62

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	319.00	0.65	207.37	
1.00	0.00	0.00	0.00	69.12
50.00	0.00	0.00	0.00	0.00
Max TY=	50.00		Total CHUs =	69.12
			AAHUs =	1.38

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	1.38
B. Future Without Project AAHUs =	167.62
Net Change (FWP - FWOP) =	-166.24

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct West Swamp MED Project Area: 319.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		39.00		39.00		39.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		35.00		35.00		30.00	
		Herbaceous		Herbaceous		Herbaceous	
		9.00		9.00		20.00	
		Class		Class		Class	
		3.00	0.40	3.00	0.40	2.00	0.20
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		4.00		4.00		5.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		537.00		537.00		914.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		17.00		17.00		16.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		2339.00	0.82	2339.00	0.82	3247.00	0.79
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Seasonal	0.70	Seasonal	0.70	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.40	1.00	0.40	1.00	1.40	0.72
		HSI =	0.65	HSI =	0.65	HSI =	0.39

Intermediate Calculations		
Class		
0.00	0.00	2.00
3.00	3.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.05	0.07
0.05	0.05	0.07
1.00	1.00	1.00
Tupelo/Cypress Basal Area		
0.82	0.82	0.79
Water Regime		
0.00	0.00	0.00
0.70	0.70	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	0.64

Project: WSLP Direct West Swamp MED Project Area: 319.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Direct West Swamp MED Project Area: 319.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct West Swamp MED Project Area: 319.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		39.00		0.00		0.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		35.00		0.00		0.00	
		Herbaceous		Herbaceous		Herbaceous	
		9.00		0.00		0.00	
		Class		Class		Class	
		3.00	0.40	1.00	0.10	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		4.00		0.00		0.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		537.00		0.00		0.00	

Intermediate Calculations		
Class		
0.00	1.00	1.00
3.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.00	0.00
0.05	0.00	0.00
1.00	0.00	0.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Direct West Swamp MED

Project Area: 319.00

FWP

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Direct West Swamp MED

Project Area: 319.00

FWP

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Direct West Swamp MED

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	319.00	0.65	207.37	
1.00	319.00	0.65	207.37	207.37
50.00	319.00	0.39	123.26	8100.34
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	8307.70
			AAHUs =	166.15

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	319.00	0.65	207.37	
1.00	0.00	0.00	0.00	69.12
50.00	0.00	0.00	0.00	0.00
Max TY=	50.00		Total CHUs =	69.12
			AAHUs =	1.38

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	1.38
B. Future Without Project AAHUs =	166.15
Net Change (FWP - FWOP) =	-164.77

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct West Swamp HIGH Project Area: 319.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		39.00		39.00		32.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		35.00		35.00		30.00	
		Herbaceous		Herbaceous		Herbaceous	
		9.00		9.00		20.00	
		Class		Class		Class	
		3.00	0.40	3.00	0.40	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		4.00		4.00		4.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		537.00		537.00		609.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		17.00		17.00		17.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		2339.00	0.82	2339.00	0.82	2604.00	0.82
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Seasonal	0.70	Seasonal	0.70	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.40	1.00	0.40	1.00	2.40	0.32
		HSI =	0.65	HSI =	0.65	HSI =	0.28

Intermediate Calculations		
Class		
0.00	0.00	1.00
3.00	3.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.05	0.05
0.05	0.05	0.05
1.00	1.00	1.00
Tupelo/Cypress Basal Area		
0.82	0.82	0.82
Water Regime		
0.00	0.00	0.00
0.70	0.70	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	0.64
1.00	1.00	0.24

Project: WSLP Direct West Swamp HIGH Project Area: 319.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Direct West Swamp HIGH Project Area: 319.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct West Swamp HIGH Project Area: 319.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		39.00		0.00		0.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		35.00		0.00		0.00	
		Herbaceous		Herbaceous		Herbaceous	
		9.00		0.00		0.00	
		Class		Class		Class	
		3.00	0.40	1.00	0.10	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		4.00		0.00		0.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		537.00		0.00		0.00	

Intermediate Calculations		
Class		
0.00	1.00	1.00
3.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.00	0.00
0.05	0.00	0.00
1.00	0.00	0.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime		
Salinity		

Project: WSLP Direct West Swamp HIGH FWP

Project Area: 319.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

Project: WSLP Direct West Swamp HIGH FWP

Project Area: 319.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

AAHU CALCULATION

Project: WSLP Direct West Swamp HIGH

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	319.00	0.65	207.37	
1.00	319.00	0.65	207.37	207.37
50.00	319.00	0.28	89.18	7265.48
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	7472.84
			AAHUs =	149.46

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	319.00	0.65	207.37	
1.00	0.00	0.00	0.00	69.12
50.00	0.00	0.00	0.00	0.00
Max TY=	50.00		Total CHUs =	69.12
			AAHUs =	1.38

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	1.38
B. Future Without Project AAHUs =	149.46
Net Change (FWP - FWOP) =	**-148.07**

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect East Swamp LOW Project Area: 2325.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		77.00		77.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		52.00		52.00		52.00	
		Herbaceous		Herbaceous		Herbaceous	
		52.00		52.00		52.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	5.00	0.80
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		2.00		2.00		2.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		15.00		15.00		29.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		11.00		11.00		9.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		76.00	0.45	76.00	0.45	172.00	0.60
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.45	Semi-Permanent	0.45	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.30	1.00	0.30	1.00	1.00	0.83
		HSI =	0.65	HSI =	0.65	HSI =	0.56

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	6.00	5.00
Tupelo/Cypress dbh		
0.02	0.02	0.02
0.02	0.02	0.02
0.90	0.90	0.70
Tupelo/Cypress Basal Area		
0.76	0.76	0.60
Water Regime		
0.00	0.00	0.00
0.45	0.45	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	0.80

Project: WSLP Indirect East Swamp LOW Project Area: 2325.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Indirect East Swamp LOW Project Area: 2325.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect East Swamp LOW Project Area: 2325.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		77.00		77.00		74.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		52.00		52.00		33.00	
		Herbaceous		Herbaceous		Herbaceous	
		52.00		52.00		30.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	4.00	0.60
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		2.00		2.00		1.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		15.00		15.00		26.00	

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	4.00
6.00	6.00	0.00
Tupelo/Cypress dbh		
0.02	0.02	0.01
0.02	0.02	0.01
0.90	0.90	0.60
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime		
Salinity		

Project: WSLP Indirect East Swamp LOW FWP

Project Area: 2325.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

Project: WSLP Indirect East Swamp LOW FWP

Project Area: 2325.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

AAHU CALCULATION

Project: WSLP Indirect East Swamp LOW

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	2325.00	0.65	1501.41	
1.00	2325.00	0.65	1501.41	1501.41
50.00	2325.00	0.56	1297.90	68583.02
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	70084.43
			AAHUs =	1401.69

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	2325.00	0.65	1501.41	
1.00	2325.00	0.65	1501.41	1501.41
50.00	2325.00	0.49	1144.21	64817.70
Max TY=	50.00		Total CHUs =	66319.11
			AAHUs =	1326.38

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	1326.38
B. Future Without Project AAHUs =	1401.69
Net Change (FWP - FWOP) =	-75.31

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect East Swamp MED Project Area: 2325.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		77.00		77.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		52.00		52.00		52.00	
		Herbaceous		Herbaceous		Herbaceous	
		52.00		52.00		52.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	5.00	0.80
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		2.00		2.00		1.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		15.00		15.00		15.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		11.00		11.00		9.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		76.00	0.45	76.00	0.45	156.00	0.64
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.45	Semi-Permanent	0.45	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.30	1.00	0.30	1.00	1.30	0.71
		HSI =	0.65	HSI =	0.65	HSI =	0.55

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	6.00	5.00
Tupelo/Cypress dbh		
0.02	0.02	0.01
0.02	0.02	0.01
0.90	0.90	0.70
Tupelo/Cypress Basal Area		
0.76	0.76	0.64
Water Regime		
0.00	0.00	0.00
0.45	0.45	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	0.68

Project: WSLP Indirect East Swamp MED Project Area: 2325.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Indirect East Swamp MED Project Area: 2325.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect East Swamp MED Project Area: 2325.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		77.00		77.00		74.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		52.00		52.00		33.00	
		Herbaceous		Herbaceous		Herbaceous	
		52.00		52.00		30.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	4.00	0.60
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		2.00		2.00		1.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		15.00		15.00		23.00	

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	4.00
6.00	6.00	0.00
Tupelo/Cypress dbh		
0.02	0.02	0.01
0.02	0.02	0.01
0.90	0.90	0.60
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Indirect East Swamp MED FWP

Project Area: 2325.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Indirect East Swamp MED FWP

Project Area: 2325.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Indirect East Swamp MED

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	2325.00	0.65	1501.41	
1.00	2325.00	0.65	1501.41	1501.41
50.00	2325.00	0.55	1286.63	68306.87
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	69808.27
			AAHUs =	1396.17

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	2325.00	0.65	1501.41	
1.00	2325.00	0.65	1501.41	1501.41
50.00	2325.00	0.46	1060.83	62774.78
Max TY=	50.00		Total CHUs =	64276.19
			AAHUs =	1285.52

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	1285.52
B. Future Without Project AAHUs =	1396.17
Net Change (FWP - FWOP) =	**-110.64**

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect East Swamp HIGH Project Area: 2325.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		77.00		77.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		52.00		52.00		32.00	
		Herbaceous		Herbaceous		Herbaceous	
		52.00		52.00		32.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	2.00	0.20
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		2.00		2.00		2.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		15.00		15.00		15.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		11.00		11.00		10.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		76.00	0.45	76.00	0.45	86.00	0.41
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.45	Semi-Permanent	0.45	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.30	1.00	0.30	1.00	2.30	0.34
		HSI =	0.65	HSI =	0.65	HSI =	0.29

Intermediate Calculations		
Class		
0.00	0.00	2.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	6.00	0.00
Tupelo/Cypress dbh		
0.02	0.02	0.02
0.02	0.02	0.02
0.90	0.90	0.80
Tupelo/Cypress Basal Area		
0.76	0.76	0.68
Water Regime		
0.00	0.00	0.00
0.45	0.45	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	0.68
1.00	1.00	0.28

Project: WSLP Indirect East Swamp HIGH Project Area: 2325.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Indirect East Swamp HIGH Project Area: 2325.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect East Swamp HIGH Project Area: 2325.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		77.00		77.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		52.00		52.00		32.00	
		Herbaceous		Herbaceous		Herbaceous	
		52.00		52.00		32.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	2.00	0.20
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		2.00		2.00		1.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		15.00		15.00		8.00	

Intermediate Calculations		
Class		
0.00	0.00	2.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	6.00	0.00
Tupelo/Cypress dbh		
0.02	0.02	0.01
0.02	0.02	0.01
0.90	0.90	0.45
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh		
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area		

Water Regime		
Salinity		

Project: WSLP Indirect East Swamp HIGH FWP

Project Area: 2325.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

Project: WSLP Indirect East Swamp HIGH FWP

Project Area: 2325.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

AAHU CALCULATION

Project: WSLP Indirect East Swamp HIGH

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	2325.00	0.65	1501.41	
1.00	2325.00	0.65	1501.41	1501.41
50.00	2325.00	0.29	680.61	53459.36
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	54960.76
			AAHUs =	1099.22

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	2325.00	0.65	1501.41	
1.00	2325.00	0.65	1501.41	1501.41
50.00	2325.00	0.23	532.60	49833.19
Max TY=	50.00		Total CHUs =	51334.60
			AAHUs =	1026.69

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	1026.69
B. Future Without Project AAHUs =	1099.22
Net Change (FWP - FWOP) =	-72.52

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect Central Swamp LOW Project Area: 4383.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		68.00		68.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		45.00		45.00		45.00	
		Herbaceous		Herbaceous		Herbaceous	
		61.00		61.00		61.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	5.00	0.80
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		1.00		1.00		1.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		55.00		55.00		158.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		15.00		15.00		13.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		1029.00	0.95	1029.00	0.95	2043.00	0.93
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Moderate		Moderate		High	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.65	Semi-Permanent	0.65	Permanent	0.65
V4	Salinity	Salinity		Salinity		Salinity	
		0.30	1.00	0.30	1.00	1.00	0.81
		HSI =	0.87	HSI =	0.87	HSI =	0.78

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	6.00	5.00
Tupelo/Cypress dbh		
0.01	0.01	0.01
0.01	0.01	0.01
1.00	1.00	1.00
Tupelo/Cypress Basal Area		
0.95	0.95	0.93
Water Regime		
0.00	0.00	0.65
0.65	0.65	0.00
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	0.80

Project: WSLP Indirect Central Swamp LOW Project Area: 4383.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Indirect Central Swamp LOW Project Area: 4383.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect Central Swamp LOW Project Area: 4383.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		68.00		68.00		68.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		45.00		45.00		45.00	
		Herbaceous		Herbaceous		Herbaceous	
		61.00		61.00		30.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	4.00	0.60
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		1.00		1.00		1.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		55.00		55.00		142.00	

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	4.00
6.00	6.00	0.00
Tupelo/Cypress dbh		
0.01	0.01	0.01
0.01	0.01	0.01
1.00	1.00	1.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Indirect Central Swamp LOW FWP

Project Area: 4383.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Indirect Central Swamp LOW FWP

Project Area: 4383.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Indirect Central Swamp LOW

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	4383.00	0.87	3802.33	
1.00	4383.00	0.87	3802.33	3802.33
50.00	4383.00	0.78	3429.18	177172.13
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	180974.46
			AAHUs =	3619.49

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	4383.00	0.87	3802.33	
1.00	4383.00	0.87	3802.33	3802.33
50.00	4383.00	0.64	2816.91	162171.43
Max TY=	50.00		Total CHUs =	165973.76
			AAHUs =	3319.48

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	3319.48
B. Future Without Project AAHUs =	3619.49
Net Change (FWP - FWOP) =	-300.01

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect Central Swamp MED Project Area: 4383.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		68.00		68.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		45.00		45.00		45.00	
		Herbaceous		Herbaceous		Herbaceous	
		61.00		61.00		61.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	5.00	0.80
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		1.00		1.00		1.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		55.00		55.00		168.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		15.00		15.00		12.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		1029.00	0.95	1029.00	0.95	1720.00	0.91
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Moderate		Moderate		High	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.65	Semi-Permanent	0.65	Permanent	0.65
V4	Salinity	Salinity		Salinity		Salinity	
		0.30	1.00	0.30	1.00	1.30	0.71
		HSI =	0.87	HSI =	0.87	HSI =	0.76

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	6.00	5.00
Tupelo/Cypress dbh		
0.01	0.01	0.01
0.01	0.01	0.01
1.00	1.00	1.00
Tupelo/Cypress Basal Area		
0.95	0.95	0.91
Water Regime		
0.00	0.00	0.65
0.65	0.65	0.00
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	0.68

Project: WSLP Indirect Central Swamp MED Project Area: 4383.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Indirect Central Swamp MED Project Area: 4383.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect Central Swamp MED Project Area: 4383.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		68.00		68.00		68.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		45.00		45.00		33.00	
		Herbaceous		Herbaceous		Herbaceous	
		61.00		61.00		30.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	4.00	0.60
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		1.00		1.00		1.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		55.00		55.00		128.00	

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	4.00
6.00	6.00	0.00
Tupelo/Cypress dbh		
0.01	0.01	0.01
0.01	0.01	0.01
1.00	1.00	0.90
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh		0.95	0.95	0.84
		15.00		15.00		11.00				
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area			Water Regime	
		1029.00	0.95	1029.00	0.95	1647.00	0.84	0.00	0.00	0.00
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange		0.65	0.65	0.45
		Moderate		Moderate		Moderate		0.00	0.00	0.00
		Flooding Duration		Flooding Duration		Flooding Duration				
		Semi-Permanent	0.65	Semi-Permanent	0.65	Permanent	0.45		Salinity	
V4	Salinity	Salinity		Salinity		Salinity		1.00	1.00	1.00
		0.30	1.00	0.30	1.00	1.30	0.70	1.00	1.00	0.68
		HSI =	**0.87**	**HSI =**	**0.87**	**HSI =**	**0.61**			

Project: WSLP Indirect Central Swamp MED FWP

Project Area: 4383.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI	Intermediate Calculations
V1	Stand Structure	% Cover		% Cover		% Cover		
		Overstory		Overstory		Overstory		Class
		Scrub-shrub		Scrub-shrub		Scrub-shrub		
		Herbaceous		Herbaceous		Herbaceous		
		Class		Class		Class		Tupelo/Cypress dbh
								0.00 0.00 0.00
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh		0.00 0.00 0.00
								0.00 0.00 0.00
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area		
								Tupelo/Cypress Basal Area
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh		
								Water Regime
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area		
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange		
		Flooding Duration		Flooding Duration		Flooding Duration		Salinity
								0.00 0.00 0.00
V4	Salinity	Salinity		Salinity		Salinity		0.00 0.00 0.00
		HSI =		**HSI =**		**HSI =**		

Project: WSLP Indirect Central Swamp MED FWP

Project Area: 4383.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI	Intermediate Calculations
V1	Stand Structure	% Cover		% Cover		% Cover		
		Overstory		Overstory		Overstory		Class
		Scrub-shrub		Scrub-shrub		Scrub-shrub		
		Herbaceous		Herbaceous		Herbaceous		
		Class		Class		Class		Tupelo/Cypress dbh
								0.00 0.00 0.00
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh		0.00 0.00 0.00
								0.00 0.00 0.00
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area		
								Tupelo/Cypress Basal Area
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh		
								Water Regime
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area		
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange		
		Flooding Duration		Flooding Duration		Flooding Duration		Salinity
								0.00 0.00 0.00
V4	Salinity	Salinity		Salinity		Salinity		0.00 0.00 0.00
		HSI =		**HSI =**		**HSI =**		

AAHU CALCULATION

Project: WSLP Indirect Central Swamp MED

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	4383.00	0.87	3802.33	
1.00	4383.00	0.87	3802.33	3802.33
50.00	4383.00	0.76	3342.79	175055.42
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	**50.00**		**Total CHUs =**	**178857.75**
			AAHUs =	**3577.15**

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	4383.00	0.87	3802.33	
1.00	4383.00	0.87	3802.33	3802.33
50.00	4383.00	0.61	2683.86	158911.59
Max TY=	**50.00**		**Total CHUs =**	**162713.92**
			AAHUs =	**3254.28**

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	3254.28
B. Future Without Project AAHUs =	3577.15
Net Change (FWP - FWOP) =	**-322.88**

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect Central Swamp HIGH Project Area: 4383.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		68.00		68.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		45.00		45.00		32.00	
		Herbaceous		Herbaceous		Herbaceous	
		61.00		61.00		32.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	2.00	0.20
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		1.00		1.00		1.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		55.00		55.00		82.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		15.00		15.00		11.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		1029.00	0.95	1029.00	0.95	1060.00	0.84
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Moderate		Moderate		High	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.65	Semi-Permanent	0.65	Permanent	0.65
V4	Salinity	Salinity		Salinity		Salinity	
		0.30	1.00	0.30	1.00	2.30	0.31
		HSI =	0.87	HSI =	0.87	HSI =	0.43

Intermediate Calculations		
Class		
0.00	0.00	2.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	6.00	0.00
Tupelo/Cypress dbh		
0.01	0.01	0.01
0.01	0.01	0.01
1.00	1.00	0.90
Tupelo/Cypress Basal Area		
0.95	0.95	0.84
Water Regime		
0.00	0.00	0.65
0.65	0.65	0.00
0.00	0.00	0.00
Salinity		
1.00	1.00	0.68
1.00	1.00	0.28

Project: WSLP Indirect Central Swamp HIGH Project Area: 4383.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Indirect Central Swamp HIGH Project Area: 4383.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect Central Swamp HIGH Project Area: 4383.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		68.00		68.00		49.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		45.00		45.00		32.00	
		Herbaceous		Herbaceous		Herbaceous	
		61.00		61.00		32.00	
		Class		Class		Class	
		6.00	1.00	6.00	1.00	2.00	0.20
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		1.00		1.00		1.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		55.00		55.00		37.00	

Intermediate Calculations		
Class		
0.00	0.00	2.00
0.00	0.00	0.00
0.00	0.00	0.00
6.00	6.00	0.00
Tupelo/Cypress dbh		
0.01	0.01	0.01
0.01	0.01	0.01
1.00	1.00	0.80
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Indirect Central Swamp HIGH FWP

Project Area: 4383.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Indirect Central Swamp HIGH FWP

Project Area: 4383.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Indirect Central Swamp HIGH

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	4383.00	0.87	3802.33	
1.00	4383.00	0.87	3802.33	3802.33
50.00	4383.00	0.43	1905.26	139835.91
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	143638.24
			AAHUs =	2872.76

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	4383.00	0.87	3802.33	
1.00	4383.00	0.87	3802.33	3802.33
50.00	4383.00	0.33	1466.95	129097.47
Max TY=	50.00		Total CHUs =	132899.80
			AAHUs =	2658.00

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	2658.00
B. Future Without Project AAHUs =	2872.76
Net Change (FWP - FWOP) =	**-214.77**

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect We Project Area: 1724.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		33.00		33.00		33.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		50.00		50.00		32.00	
		Herbaceous		Herbaceous		Herbaceous	
		9.00		9.00		9.00	
		Class		Class		Class	
		3.00	0.40	3.00	0.40	2.00	0.20
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		3.90		3.90		5.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		512.00		512.00		1107.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		17.50		17.50		16.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		2322.00	0.83	2322.00	0.83	3422.00	0.77
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Seasonal	0.70	Seasonal	0.70	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.40	1.00	0.40	1.00	1.00	0.85
		HSI =	0.65	HSI =	0.65	HSI =	0.39

Intermediate Calculations		
Class		
0.00	0.00	2.00
3.00	3.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.05	0.07
0.05	0.05	0.07
1.00	1.00	1.00
Tupelo/Cypress Basal Area		
0.83	0.83	0.77
Water Regime		
0.00	0.00	0.00
0.70	0.70	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	0.80

Project: WSLP Indirect West Swamp LOW Project Area: 1724.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Indirect West Swamp LOW Project Area: 1724.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect West Swamp LOW Project Area: 1724.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		33.00		33.00		32.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		50.00		50.00		30.00	
		Herbaceous		Herbaceous		Herbaceous	
		9.00		9.00		10.00	
		Class		Class		Class	
		3.00	0.40	3.00	0.40	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		3.90		3.90		5.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		512.00		512.00		1041.00	

Intermediate Calculations		
Class		
0.00	0.00	1.00
3.00	3.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.05	0.07
0.05	0.05	0.07
1.00	1.00	1.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Indirect West Swamp LOW FWP

Project Area: 1724.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Indirect West Swamp LOW FWP

Project Area: 1724.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Indirect West Swamp LOW

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	1724.00	0.65	1122.56	
1.00	1724.00	0.65	1122.56	1122.56
50.00	1724.00	0.39	677.91	44111.58
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	45234.14
			AAHUs =	904.68

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	1724.00	0.65	1122.56	
1.00	1724.00	0.65	1122.56	1122.56
50.00	1724.00	0.32	550.64	40993.52
Max TY=	50.00		Total CHUs =	42116.08
			AAHUs =	842.32

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	842.32
B. Future Without Project AAHUs =	904.68
Net Change (FWP - FWOP) =	-62.36

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect West Swamp MED Project Area: 1724.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		33.00		33.00		33.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		50.00		50.00		32.00	
		Herbaceous		Herbaceous		Herbaceous	
		9.00		9.00		9.00	
		Class		Class		Class	
		3.00	0.40	3.00	0.40	2.00	0.20
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		3.90		3.90		5.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		512.00		512.00		1010.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		17.50		17.50		15.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		2322.00	0.83	2322.00	0.83	3120.00	0.77
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Seasonal	0.70	Seasonal	0.70	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.40	1.00	0.40	1.00	1.40	0.73
		HSI =	0.65	HSI =	0.65	HSI =	0.38

Intermediate Calculations		
Class		
0.00	0.00	2.00
3.00	3.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.05	0.07
0.05	0.05	0.07
1.00	1.00	1.00
Tupelo/Cypress Basal Area		
0.83	0.83	0.77
Water Regime		
0.00	0.00	0.00
0.70	0.70	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	0.64

Project: WSLP Indirect West Swamp MED Project Area: 1724.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Indirect West Swamp MED Project Area: 1724.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect West Swamp MED Project Area: 1724.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		33.00		33.00		30.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		50.00		50.00		30.00	
		Herbaceous		Herbaceous		Herbaceous	
		9.00		9.00		10.00	
		Class		Class		Class	
		3.00	0.40	3.00	0.40	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		3.90		3.90		5.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		512.00		512.00		952.00	

Intermediate Calculations		
Class		
0.00	0.00	1.00
3.00	3.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.05	0.07
0.05	0.05	0.07
1.00	1.00	1.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Indirect West Swamp MED FWP

Project Area: 1724.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Indirect West Swamp MED FWP

Project Area: 1724.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Indirect West Swamp MED

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	1724.00	0.65	1122.56	
1.00	1724.00	0.65	1122.56	1122.56
50.00	1724.00	0.38	662.45	43732.74
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	44855.30
			AAHUs =	897.11

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	1724.00	0.65	1122.56	
1.00	1724.00	0.65	1122.56	1122.56
50.00	1724.00	0.31	538.08	40685.82
Max TY=	50.00		Total CHUs =	41808.38
			AAHUs =	836.17

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	836.17
B. Future Without Project AAHUs =	897.11
Net Change (FWP - FWOP) =	-60.94

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect West Swamp HIGH Project Area: 1724.00

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		33.00		33.00		30.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		50.00		50.00		30.00	
		Herbaceous		Herbaceous		Herbaceous	
		9.00		9.00		9.00	
		Class		Class		Class	
		3.00	0.40	3.00	0.40	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		3.90		3.90		4.90	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		512.00		512.00		780.00	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		17.50		17.50		15.00	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		2322.00	0.83	2322.00	0.83	2410.00	0.77
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Seasonal	0.70	Seasonal	0.70	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.40	1.00	0.40	1.00	2.40	0.34
		HSI =	0.65	HSI =	0.65	HSI =	0.28

Intermediate Calculations		
Class		
0.00	0.00	1.00
3.00	3.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.05	0.06
0.05	0.05	0.06
1.00	1.00	1.00
Tupelo/Cypress Basal Area		
0.83	0.83	0.77
Water Regime		
0.00	0.00	0.00
0.70	0.70	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	0.64
1.00	1.00	0.24

Project: WSLP Indirect West Swamp HIGH Project Area: 1724.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Indirect West Swamp HIGH Project Area: 1724.00

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Indirect West Swamp HIGH Project Area: 1724.00

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		33.00		33.00		30.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		50.00		50.00		30.00	
		Herbaceous		Herbaceous		Herbaceous	
		9.00		9.00		9.00	
		Class		Class		Class	
		3.00	0.40	3.00	0.40	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		3.90		3.90		4.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		512.00		512.00		536.00	

Intermediate Calculations		
Class		
0.00	0.00	1.00
3.00	3.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.05	0.05	0.05
0.05	0.05	0.05
1.00	1.00	1.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime		
Salinity		

Project: WSLP Indirect West Swamp HIGH FWP

Project Area: 1724.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

Project: WSLP Indirect West Swamp HIGH FWP

Project Area: 1724.00

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

AAHU CALCULATION

Project: WSLP Indirect West Swamp HIGH

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	1724.00	0.65	1122.56	
1.00	1724.00	0.65	1122.56	1122.56
50.00	1724.00	0.28	479.48	39249.90
			#VALUE!	
			#VALUE!	
			#VALUE!	
Max TY=	50.00		Total CHUs =	40372.46
			AAHUs =	807.45

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	1724.00	0.65	1122.56	
1.00	1724.00	0.65	1122.56	1122.56
50.00	1724.00	0.28	478.94	39236.72
Max TY=	50.00		Total CHUs =	40359.28
			AAHUs =	807.19

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	807.19
B. Future Without Project AAHUs =	807.45
Net Change (FWP - FWOP) =	-0.26

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: WSLP Direct West BLH LOW Acres: 123.00

Condition: Future Without Project

Variable		TY 0.00 Class/Value	SI	TY 1.00 Class/Value	SI	TY 50.00 Class/Value	SI
V1	Species Assoc.	Class 4.00	0.80	Class 4.00	0.80	Class 4.00	0.80
V2	Maturity (input age or dbh, not both)	Age / dbh 14.50	0.63	Age / dbh 15.00	0.67	Age / dbh 21.30	1.00
V3	Understory / Midstory	Understory % 52.00 / Midstory % 73.00	0.89	Understory % 52.00 / Midstory % 73.00	0.89	Understory % 60.00 / Midstory % 80.00	0.85
V4	Hydrology	Flow/Exchange High / Flooding Duration Temporary	1.00	Flow/Exchange High / Flooding Duration Temporary	1.00	Flow/Exchange High / Flooding Duration Seasonal	0.85
V5	Forest Size	Class 4.00	0.77	Class 4.00	0.77	Class 4.00	0.77
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh	34.00	0.40	34.00	0.40	34.00	0.40
	Abandoned Ag	0.00		0.00		0.00	
	Pasture / Hay	0.00		0.00		0.00	
	Active Ag	32.00		32.00		32.00	
	Development	34.00		34.00		34.00	
V7	Disturbance Type	Class	0.83	Class	0.83	Class	0.83
	Disturbance Distance	Class		Class		Class	
		HSI =	**0.75**	**HSI =**	**0.76**	**HSI =**	**0.82**

Intermediate Calculations

Understory/Midstory		
1.00	1.00	1.00
0.77	0.77	0.70
Hydrology		
1.00	1.00	0.85
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Direct West BLH LOW Acres: 123.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age / dbh		Age / dbh		Age / dbh	
V3	Understory / Midstory	Understory % / Midstory %		Understory % / Midstory %		Understory % / Midstory %	
V4	Hydrology	Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh, Abandoned Ag, Pasture / Hay, Active Ag, Development						
V7	Disturbance Type / Disturbance Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Project: WSLP Direct West BLH LOW Acres: 123.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age / dbh		Age / dbh		Age / dbh	
V3	Understory / Midstory	Understory % / Midstory %		Understory % / Midstory %		Understory % / Midstory %	
V4	Hydrology	Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh, Abandoned Ag, Pasture / Hay, Active Ag, Development						
V7	Disturbance Type / Disturbance Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: WSLP Direct West BLH LOW Acres: 123.00

Condition: Future With Project

Variable		TY 0.00 Class/Value	SI	TY 1.00 Class/Value	SI	TY 50.00 Class/Value	SI
V1	Species Assoc.	Class 4.00	0.80	Class 1.00	0.20	Class 1.00	0.20
V2	Maturity (input age or dbh, not both)	Age / dbh 14.50	0.63	Age / dbh 5.00	0.05	Age / dbh 5.00	0.05
V3	Understory / Midstory	Understory % 52.00 / Midstory % 73.00	0.89	Understory % 0.00 / Midstory % 0.00	0.10	Understory % 0.00 / Midstory % 0.00	0.10
V4	Hydrology	Flow/Exchange High / Flooding Duration		Flow/Exchange None / Flooding Duration		Flow/Exchange None / Flooding Duration	

Intermediate Calculations

1.00	0.10	0.10
0.77	0.10	0.10
Hydrology		
1.00	0.00	0.00
0.00	0.00	0.00

		Temporary	1.00	Permanent	0.10	Permanent	0.10	0.00	0.10	0.10
V5	Forest Size	Class	0.77	Class	0.00	Class	0.00			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	34.00	0.40	29.00	0.35	28.00	0.30			
	Abandoned Ag	0.00		0.00		0.00				
	Pasture / Hay	0.00		0.00		0.00				
	Active Ag	32.00		32.00		11.00				
	Development	34.00		39.00		61.00				
V7	Disturbance									
	Type	Class		Class		Class				
		0.83		0.83		0.79				
	Distance	Class		Class		Class				
		HSI = 0.75		**HSI = 0.00**		**HSI = 0.00**				

Project: WSLP Direct West BLH LOW FWP

Acres: 123.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age		Age		Age	
		dbh		dbh		dbh	
V3	Understory / Midstory	Understory %		Understory %		Understory %	
		Midstory %		Midstory %		Midstory %	
V4	Hydrology	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh						
	Abandoned Ag						
	Pasture / Hay						
	Active Ag						
	Development						
V7	Disturbance						
	Type	Class		Class		Class	
	Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Understory/Midstory

Hydrology

Project: WSLP Direct West BLH LOW FWP

Acres: 123.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age		Age		Age	
		dbh		dbh		dbh	
V3	Understory / Midstory	Understory %		Understory %		Understory %	
		Midstory %		Midstory %		Midstory %	
V4	Hydrology	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh						
	Abandoned Ag						
	Pasture / Hay						
	Active Ag						
	Development						
V7	Disturbance						
	Type	Class		Class		Class	
	Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Hydrology

AAHU CALCULATION, Bottomland Hardwoods

Project: WSLP Direct West BLH LOW

Future Without Project TY	Acres	x HSI	Total HUs	Cummulative HUs
0.00	123.00	**0.75**	92.24	
1.00	123.00	**0.76**	93.52	92.88
50.00	123.00	**0.82**	101.40	4775.44
MAX	50.00		**Total CHUs =**	**4868.31**
			AAHUs =	**97.37**

Future With Project TY	Acres	x HSI	Total HUs	Cummulative HUs
0.00	123.00	**0.75**	92.24	
1.00	0.00	**0.00**	0.00	30.75
50.00	0.00	**0.00**	0.00	0.00
MAX	50.00		**Total CHUs =**	**30.75**
			AAHUs =	**0.61**

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future Without Project AAHUs =	97.37
B. Future With Project AAHUs =	0.61
Net Change (FWP - FWOP) =	**-96.75**

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: WSLP Direct West BLH LOW Acres: 123.00

Condition: Future Without Project

Variable		TY 0.00 Class/Value	SI	TY 1.00 Class/Value	SI	TY 50.00 Class/Value	SI
V1	Species Assoc.	Class 4.00	0.80	Class 4.00	0.80	Class 4.00	0.80
V2	Maturity (input age or dbh, not both)	Age / dbh 14.50	0.63	Age / dbh 15.00	0.67	Age / dbh 20.20	1.00
V3	Understory / Midstory	Understory % 52.00 / Midstory % 73.00	0.89	Understory % 52.00 / Midstory % 73.00	0.89	Understory % 70.00 / Midstory % 80.00	0.80
V4	Hydrology	Flow/Exchange High / Flooding Duration Temporary	1.00	Flow/Exchange High / Flooding Duration Temporary	1.00	Flow/Exchange High / Flooding Duration Semi-Permanent	0.75
V5	Forest Size	Class 4.00	0.77	Class 4.00	0.77	Class 4.00	0.77
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh	34.00	0.40	34.00	0.40	34.00	0.40
	Abandoned Ag	0.00		0.00		0.00	
	Pasture / Hay	0.00		0.00		0.00	
	Active Ag	32.00		32.00		32.00	
	Development	34.00		34.00		34.00	
V7	Disturbance Type	Class	0.83	Class	0.83	Class	0.83
	Disturbance Distance	Class		Class		Class	
		HSI =	**0.75**	**HSI =**	**0.76**	**HSI =**	**0.80**

Intermediate Calculations

Understory/Midstory		
1.00	1.00	0.90
0.77	0.77	0.70
Hydrology		
1.00	1.00	0.75
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Direct West BLH LOW Acres: 123.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age / dbh		Age / dbh		Age / dbh	
V3	Understory / Midstory	Understory % / Midstory %		Understory % / Midstory %		Understory % / Midstory %	
V4	Hydrology	Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh, Abandoned Ag, Pasture / Hay, Active Ag, Development						
V7	Disturbance Type / Disturbance Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Hydrology

Project: WSLP Direct West BLH LOW Acres: 123.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age / dbh		Age / dbh		Age / dbh	
V3	Understory / Midstory	Understory % / Midstory %		Understory % / Midstory %		Understory % / Midstory %	
V4	Hydrology	Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh, Abandoned Ag, Pasture / Hay, Active Ag, Development						
V7	Disturbance Type / Disturbance Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Hydrology

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: WSLP Direct West BLH LOW Acres: 123.00

Condition: Future With Project

Variable		TY 0.00 Class/Value	SI	TY 1.00 Class/Value	SI	TY 50.00 Class/Value	SI
V1	Species Assoc.	Class 4.00	0.80	Class 1.00	0.20	Class 1.00	0.20
V2	Maturity (input age or dbh, not both)	Age / dbh 14.50	0.63	Age / dbh 5.00	0.05	Age / dbh 5.00	0.05
V3	Understory / Midstory	Understory % 52.00 / Midstory % 73.00	0.89	Understory % 0.00 / Midstory % 0.00	0.10	Understory % 0.00 / Midstory % 0.00	0.10
V4	Hydrology	Flow/Exchange High / Flooding Duration		Flow/Exchange None / Flooding Duration		Flow/Exchange None / Flooding Duration	

Intermediate Calculations

1.00	0.10	0.10
0.77	0.10	0.10
Hydrology		
1.00	0.00	0.00
0.00	0.00	0.00

		Temporary	1.00	Permanent	0.10	Permanent	0.10
V5	Forest Size	Class	0.77	Class	0.00	Class	0.00
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh	34.00	0.40	29.00	0.35	28.00	0.30
	Abandoned Ag	0.00		0.00		0.00	
	Pasture / Hay	0.00		0.00		0.00	
	Active Ag	32.00		32.00		11.00	
	Development	34.00		39.00		61.00	
V7	Disturbance						
	Type	Class		Class		Class	
			0.83		0.83		0.79
	Distance	Class		Class		Class	
		HSI =	**0.75**	**HSI =**	**0.00**	**HSI =**	**0.00**

0.00	0.10	0.10

Project: WSLP Direct West BLH LOW FWP

Acres: 123.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age		Age		Age	
		dbh		dbh		dbh	
V3	Understory / Midstory	Understory %		Understory %		Understory %	
		Midstory %		Midstory %		Midstory %	
V4	Hydrology	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh						
	Abandoned Ag						
	Pasture / Hay						
	Active Ag						
	Development						
V7	Disturbance						
	Type	Class		Class		Class	
	Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Understory/Midstory

Hydrology

Project: WSLP Direct West BLH LOW FWP

Acres: 123.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age		Age		Age	
		dbh		dbh		dbh	
V3	Understory / Midstory	Understory %		Understory %		Understory %	
		Midstory %		Midstory %		Midstory %	
V4	Hydrology	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh						
	Abandoned Ag						
	Pasture / Hay						
	Active Ag						
	Development						
V7	Disturbance						
	Type	Class		Class		Class	
	Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Hydrology

AAHU CALCULATION, Bottomland Hardwoods

Project: WSLP Direct West BLH LOW

Future Without Project TY	Acres	x HSI	Total HUs	Cummulative HUs
0.00	123.00	**0.75**	92.24	
1.00	123.00	**0.76**	93.52	92.88
50.00	123.00	**0.80**	98.92	4714.65
MAX	50.00		**Total CHUs =**	**4807.53**
			AAHUs =	**96.15**

Future With Project TY	Acres	x HSI	Total HUs	Cummulative HUs
0.00	123.00	**0.75**	92.24	
1.00	0.00	**0.00**	0.00	30.75
50.00	0.00	**0.00**	0.00	0.00
MAX	50.00		**Total CHUs =**	**30.75**
			AAHUs =	**0.61**

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future Without Project AAHUs =	96.15
B. Future With Project AAHUs =	0.61
Net Change (FWP - FWOP) =	**-95.54**

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: WSLP Direct West BLH LOW Acres: 123.00

Condition: Future Without Project

Variable		TY 0.00 Class/Value	SI	TY 1.00 Class/Value	SI	TY 50.00 Class/Value	SI
V1	Species Assoc.	Class 4.00	0.80	Class 4.00	0.80	Class 3.00	0.60
V2	Maturity (input age or dbh, not both)	Age / dbh 14.50	0.63	Age / dbh 15.00	0.67	Age / dbh 19.20	0.95
V3	Understory / Midstory	Understory % 52.00 / Midstory % 73.00	0.89	Understory % 52.00 / Midstory % 73.00	0.89	Understory % 10.00 / Midstory % 20.00	0.70
V4	Hydrology	Flow/Exchange High / Flooding Duration Temporary	1.00	Flow/Exchange High / Flooding Duration Temporary	1.00	Flow/Exchange High / Flooding Duration Permanent	0.65
V5	Forest Size	Class 4.00	0.77	Class 4.00	0.77	Class 4.00	0.77
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh	34.00	0.40	34.00	0.40	34.00	0.40
	Abandoned Ag	0.00		0.00		0.00	
	Pasture / Hay	0.00		0.00		0.00	
	Active Ag	32.00		32.00		32.00	
	Development	34.00		34.00		34.00	
V7	Disturbance Type	Class	0.83	Class	0.83	Class	0.83
	Disturbance Distance	Class		Class		Class	
		HSI =	**0.75**	**HSI =**	**0.76**	**HSI =**	**0.71**

Intermediate Calculations

Understory/Midstory		
1.00	1.00	0.40
0.77	0.77	1.00
Hydrology		
1.00	1.00	0.65
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP Direct West BLH LOW Acres: 123.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age / dbh		Age / dbh		Age / dbh	
V3	Understory / Midstory	Understory % / Midstory %		Understory % / Midstory %		Understory % / Midstory %	
V4	Hydrology	Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh Abandoned Ag Pasture / Hay Active Ag Development						
V7	Disturbance Type	Class		Class		Class	
	Disturbance Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Project: WSLP Direct West BLH LOW Acres: 123.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age / dbh		Age / dbh		Age / dbh	
V3	Understory / Midstory	Understory % / Midstory %		Understory % / Midstory %		Understory % / Midstory %	
V4	Hydrology	Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh Abandoned Ag Pasture / Hay Active Ag Development						
V7	Disturbance Type	Class		Class		Class	
	Disturbance Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: WSLP Direct West BLH LOW Acres: 123.00

Condition: Future With Project

Variable		TY 0.00 Class/Value	SI	TY 1.00 Class/Value	SI	TY 50.00 Class/Value	SI
V1	Species Assoc.	Class 4.00	0.80	Class 1.00	0.20	Class 1.00	0.20
V2	Maturity (input age or dbh, not both)	Age / dbh 14.50	0.63	Age / dbh 5.00	0.05	Age / dbh 5.00	0.05
V3	Understory / Midstory	Understory % 52.00 / Midstory % 73.00	0.89	Understory % 0.00 / Midstory % 0.00	0.10	Understory % 0.00 / Midstory % 0.00	0.10
V4	Hydrology	Flow/Exchange High / Flooding Duration		Flow/Exchange None / Flooding Duration		Flow/Exchange None / Flooding Duration	

Intermediate Calculations

1.00	0.10	0.10
0.77	0.10	0.10
Hydrology		
1.00	0.00	0.00
0.00	0.00	0.00

		Temporary	1.00	Permanent	0.10	Permanent	0.10	0.00	0.10	0.10
V5	Forest Size	Class	0.77	Class	0.00	Class	0.00			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	34.00	0.40	29.00	0.35	28.00	0.30			
	Abandoned Ag	0.00		0.00		0.00				
	Pasture / Hay	0.00		0.00		0.00				
	Active Ag	32.00		32.00		11.00				
	Development	34.00		39.00		61.00				
V7	Disturbance									
	Type	Class		Class		Class				
		0.83		0.83		0.79				
	Distance	Class		Class		Class				
		HSI = 0.75		**HSI = 0.00**		**HSI = 0.00**				

Project: WSLP Direct West BLH LOW FWP

Acres: 123.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age		Age		Age	
		dbh		dbh		dbh	
V3	Understory / Midstory	Understory %		Understory %		Understory %	
		Midstory %		Midstory %		Midstory %	
V4	Hydrology	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh						
	Abandoned Ag						
	Pasture / Hay						
	Active Ag						
	Development						
V7	Disturbance						
	Type	Class		Class		Class	
	Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Understory/Midstory

Hydrology

Project: WSLP Direct West BLH LOW FWP

Acres: 123.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age		Age		Age	
		dbh		dbh		dbh	
V3	Understory / Midstory	Understory %		Understory %		Understory %	
		Midstory %		Midstory %		Midstory %	
V4	Hydrology	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh						
	Abandoned Ag						
	Pasture / Hay						
	Active Ag						
	Development						
V7	Disturbance						
	Type	Class		Class		Class	
	Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Hydrology

AAHU CALCULATION, Bottomland Hardwoods

Project: WSLP Direct West BLH LOW

Future Without Project TY	Acres	x HSI	Total HUs	Cummulative HUs
0.00	123.00	**0.75**	92.24	
1.00	123.00	**0.76**	93.52	92.88
50.00	123.00	**0.71**	87.06	4424.06
MAX	50.00		**Total CHUs =**	**4516.93**
			AAHUs =	**90.34**

Future With Project TY	Acres	x HSI	Total HUs	Cummulative HUs
0.00	123.00	**0.75**	92.24	
1.00	0.00	**0.00**	0.00	30.75
50.00	0.00	**0.00**	0.00	0.00
MAX	50.00		**Total CHUs =**	**30.75**
			AAHUs =	**0.61**

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future Without Project AAHUs =	90.34
B. Future With Project AAHUs =	0.61
Net Change (FWP - FWOP) =	**-89.72**

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: WSLP INDirect West BLH LOW Acres: 89.00

Condition: Future Without Project

Variable		TY Class/Value	0.00 SI	TY Class/Value	1.00 SI	TY Class/Value	50.00 SI
V1	Species Assoc.	Class 5.00	1.00	Class 5.00	1.00	Class 5.00	1.00
V2	Maturity (input age or dbh, not both)	Age / dbh 15.90	0.73	Age / dbh 15.90	0.73	Age / dbh 22.00	1.00
V3	Understory / Midstory	Understory % 35.00 / Midstory % 20.00	1.00	Understory % 35.00 / Midstory % 20.00	1.00	Understory % 45.00 / Midstory % 30.00	1.00
V4	Hydrology	Flow/Exchange High / Flooding Duration Temporary	1.00	Flow/Exchange High / Flooding Duration Temporary	1.00	Flow/Exchange High / Flooding Duration Seasonal	0.85
V5	Forest Size	Class 3.00	0.60	Class 3.00	0.60	Class 3.00	0.60
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh	28.00	0.36	28.00	0.36	28.00	0.36
	Abandoned Ag	0.00		0.00		0.00	
	Pasture / Hay	0.00		0.00		0.00	
	Active Ag	40.00		40.00		40.00	
	Development	32.00		32.00		32.00	
V7	Disturbance Type	Class	0.85	Class	0.85	Class	0.85
	Distance	Class		Class		Class	
		HSI =	**0.82**	**HSI =**	**0.82**	**HSI =**	**0.87**

Intermediate Calculations

Understory/Midstory		
1.00	1.00	1.00
1.00	1.00	1.00

Hydrology		
1.00	1.00	0.85
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP INDirect West BLH LOW Acres: 89.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age / dbh		Age / dbh		Age / dbh	
V3	Understory / Midstory	Understory % / Midstory %		Understory % / Midstory %		Understory % / Midstory %	
V4	Hydrology	Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh, Abandoned Ag, Pasture / Hay, Active Ag, Development						
V7	Disturbance Type / Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Project: WSLP INDirect West BLH LOW Acres: 89.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age / dbh		Age / dbh		Age / dbh	
V3	Understory / Midstory	Understory % / Midstory %		Understory % / Midstory %		Understory % / Midstory %	
V4	Hydrology	Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh, Abandoned Ag, Pasture / Hay, Active Ag, Development						
V7	Disturbance Type / Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: WSLP INDirect West BLH LOW Acres: 89.00

Condition: Future With Project

Variable		TY Class/Value	0.00 SI	TY Class/Value	1.00 SI	TY Class/Value	50.00 SI
V1	Species Assoc.	Class 5.00	1.00	Class 5.00	1.00	Class 5.00	1.00
V2	Maturity (input age or dbh, not both)	Age / dbh 15.90	0.73	Age / dbh 15.90	0.73	Age / dbh 20.90	1.00
V3	Understory / Midstory	Understory % 35.00 / Midstory % 20.00	1.00	Understory % 35.00 / Midstory % 20.00	1.00	Understory % 45.00 / Midstory % 30.00	1.00
V4	Hydrology	Flow/Exchange High / Flooding Duration		Flow/Exchange High / Flooding Duration		Flow/Exchange Moderate / Flooding Duration	

Intermediate Calculations

Understory/Midstory		
1.00	1.00	1.00
1.00	1.00	1.00

Hydrology		
1.00	1.00	0.75
0.00	0.00	0.00

		Temporary	1.00	Temporary	1.00	Seasonal	0.75	0.00	0.00	0.00
V5	Forest Size	Class 3.00	0.60	Class 3.00	0.60	Class 3.00	0.60			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	28.00	0.36	18.00	0.26	19.00	0.21			
	Abandoned Ag	0.00		0.00		0.00				
	Pasture / Hay	0.00		0.00		0.00				
	Active Ag	40.00		40.00		8.00				
	Development	32.00		42.00		73.00				
V7	Disturbance									
	Type	Class	0.85	Class	0.85	Class	0.78			
	Distance	Class		Class		Class				
		HSI =	**0.82**	**HSI =**	**0.80**	**HSI =**	**0.82**			

Project: WSLP INDirect West BLH LOW FWP

Acres: 89.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI	Intermediate Calculations
V1	Species Assoc.	Class		Class		Class		
V2	Maturity (input age or dbh, not both)	Age dbh		Age dbh		Age dbh		
V3	Understory / Midstory	Understory % Midstory %		Understory % Midstory %		Understory % Midstory %		Understory/Midstory
V4	Hydrology	Flow/Exchange Flooding Duration		Flow/Exchange Flooding Duration		Flow/Exchange Flooding Duration		Hydrology
V5	Forest Size	Class		Class		Class		
V6	Surrounding Land Use Forest / marsh Abandoned Ag Pasture / Hay Active Ag Development	Values %		Values %		Values %		
V7	Disturbance Type Distance	Class Class		Class Class		Class Class		
		HSI =		**HSI =**		**HSI =**		

Project: WSLP INDirect West BLH LOW FWP

Acres: 89.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI	Intermediate Calculations
V1	Species Assoc.	Class		Class		Class		
V2	Maturity (input age or dbh, not both)	Age dbh		Age dbh		Age dbh		
V3	Understory / Midstory	Understory % Midstory %		Understory % Midstory %		Understory % Midstory %		
V4	Hydrology	Flow/Exchange Flooding Duration		Flow/Exchange Flooding Duration		Flow/Exchange Flooding Duration		Hydrology
V5	Forest Size	Class		Class		Class		
V6	Surrounding Land Use Forest / marsh Abandoned Ag Pasture / Hay Active Ag Development	Values %		Values %		Values %		
V7	Disturbance Type Distance	Class Class		Class Class		Class Class		
		HSI =		**HSI =**		**HSI =**		

AAHU CALCULATION, Bottomland Hardwoods

Project: WSLP INDirect West BLH LOW

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	89.00	**0.82**	73.02	
1.00	89.00	**0.82**	73.02	73.02
50.00	89.00	**0.87**	77.79	3694.74
MAX	50.00		**Total CHUs =**	**3767.76**
			AAHUs =	**75.36**

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	89.00	**0.82**	73.02	
1.00	89.00	**0.80**	71.45	72.24
50.00	89.00	**0.82**	73.28	3546.03
MAX	50.00		**Total CHUs =**	**3618.26**
			AAHUs =	**72.37**

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future Without Project AAHUs =	75.36
B. Future With Project AAHUs =	72.37
Net Change (FWP - FWOP) =	**-2.99**

COMMUNITY HABITAT SUITABILITY MODEL

Bottomland Hardwoods

Project: WSLP INDirect West BLH LOW Acres: 89.00

Condition: Future Without Project

Variable		TY Class/Value	0.00 SI	TY Class/Value	1.00 SI	TY Class/Value	50.00 SI
V1	Species Assoc.	Class 5.00	1.00	Class 5.00	1.00	Class 5.00	1.00
V2	Maturity (input age or dbh, not both)	Age / dbh 15.90	0.73	Age / dbh 15.90	0.73	Age / dbh 20.90	1.00
V3	Understory / Midstory	Understory % 35.00 / Midstory % 20.00	1.00	Understory % 35.00 / Midstory % 20.00	1.00	Understory % 55.00 / Midstory % 30.00	1.00
V4	Hydrology	Flow/Exchange High; Flooding Duration Temporary	1.00	Flow/Exchange High; Flooding Duration Temporary	1.00	Flow/Exchange High; Flooding Duration Semi-Permanent	0.75
V5	Forest Size	Class 3.00	0.60	Class 3.00	0.60	Class 3.00	0.60
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh	28.00	0.36	28.00	0.36	28.00	0.36
	Abandoned Ag	0.00		0.00		0.00	
	Pasture / Hay	0.00		0.00		0.00	
	Active Ag	40.00		40.00		40.00	
	Development	32.00		32.00		32.00	
V7	Disturbance Type	Class	0.85	Class	0.85	Class	0.85
	Distance	Class		Class		Class	
		HSI =	**0.82**	**HSI =**	**0.82**	**HSI =**	**0.86**

Intermediate Calculations

Understory/Midstory		
1.00	1.00	1.00
1.00	1.00	1.00

Hydrology		
1.00	1.00	0.75
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP INDirect West BLH LOW Acres: 89.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age / dbh		Age / dbh		Age / dbh	
V3	Understory / Midstory	Understory % / Midstory %		Understory % / Midstory %		Understory % / Midstory %	
V4	Hydrology	Flow/Exchange; Flooding Duration		Flow/Exchange; Flooding Duration		Flow/Exchange; Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh / Abandoned Ag / Pasture / Hay / Active Ag / Development						
V7	Disturbance Type	Class		Class		Class	
	Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Hydrology

Project: WSLP INDirect West BLH LOW Acres: 89.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age		Age		Age	
		dbh		dbh		dbh	
V3	Understory / Midstory	Understory %		Understory %		Understory %	
		Midstory %		Midstory %		Midstory %	
V4	Hydrology	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh						
	Abandoned Ag						
	Pasture / Hay						
	Active Ag						
	Development						
V7	Disturbance						
	Type	Class		Class		Class	
	Distance	Class		Class		Class	
		HSI =		HSI =		HSI =	

Intermediate Calculations

Hydrology		

COMMUNITY HABITAT SUITABILITY MODEL

Bottomland Hardwoods

Project: WSLP INDirect West BLH LOW Acres: 89.00

Condition: Future With Project

Variable		TY Class/Value	0.00 SI	TY Class/Value	1.00 SI	TY Class/Value	50.00 SI
V1	Species Assoc.	Class		Class		Class	
		5.00	1.00	5.00	1.00	5.00	1.00
V2	Maturity (input age or dbh, not both)	Age		Age		Age	
		dbh		dbh		dbh	
		15.90	0.73	15.90	0.73	19.90	1.00
V3	Understory / Midstory	Understory %		Understory %		Understory %	
		35.00		35.00		55.00	
		Midstory %		Midstory %		Midstory %	
		20.00	1.00	20.00	1.00	30.00	1.00
V4	Hydrology	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		High		High		Moderate	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Temporary	1.00	Temporary	1.00	Semi-Permanent	0.65
V5	Forest Size	Class		Class		Class	
		3.00	0.60	3.00	0.60	3.00	0.60
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh	28.00	0.36	18.00	0.26	19.00	0.21
	Abandoned Ag	0.00		0.00		0.00	
	Pasture / Hay	0.00		0.00		0.00	
	Active Ag	40.00		40.00		8.00	
	Development	32.00		42.00		73.00	
V7	Disturbance						
	Type	Class		Class		Class	
			0.85		0.85		0.78
	Distance	Class		Class		Class	
		HSI =	0.82	HSI =	0.80	HSI =	0.81

Intermediate Calculations

Understory/Midstory		
1.00	1.00	1.00
1.00	1.00	1.00
Hydrology		
1.00	1.00	0.00
0.00	0.00	0.65
0.00	0.00	0.00

Project: WSLP INDirect West BLH LOW FWP

Acres: 89.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age		Age		Age	
		dbh		dbh		dbh	
V3	Understory / Midstory	Understory %		Understory %		Understory %	
		Midstory %		Midstory %		Midstory %	
V4	Hydrology	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh						
	Abandoned Ag						
	Pasture / Hay						
	Active Ag						
	Development						
V7	Disturbance						
	Type	Class		Class		Class	
	Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Understory/Midstory

Hydrology

Project: WSLP INDirect West BLH LOW FWP

Acres: 89.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age		Age		Age	
		dbh		dbh		dbh	
V3	Understory / Midstory	Understory %		Understory %		Understory %	
		Midstory %		Midstory %		Midstory %	
V4	Hydrology	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh						
	Abandoned Ag						
	Pasture / Hay						
	Active Ag						
	Development						
V7	Disturbance						
	Type	Class		Class		Class	
	Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Hydrology

AAHU CALCULATION, Bottomland Hardwoods

Project: WSLP INDirect West BLH LOW

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	89.00	**0.82**	73.02	
1.00	89.00	**0.82**	73.02	73.02
50.00	89.00	**0.86**	76.50	3663.20
MAX	50.00		**Total CHUs =**	**3736.22**
			AAHUs =	**74.72**

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	89.00	**0.82**	73.02	
1.00	89.00	**0.80**	71.45	72.24
50.00	89.00	**0.81**	71.81	3509.88
MAX	50.00		**Total CHUs =**	**3582.12**
			AAHUs =	**71.64**

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future Without Project AAHUs =	74.72
B. Future With Project AAHUs =	71.64
Net Change (FWP - FWOP) =	**-3.08**

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: WSLP INDirect West BLH LOW Acres: 89.00

Condition: Future Without Project

Variable		TY Class/Value	0.00 SI	TY Class/Value	1.00 SI	TY Class/Value	50.00 SI
V1	Species Assoc.	Class 5.00	1.00	Class 5.00	1.00	Class 4.00	0.80
V2	Maturity (input age or dbh, not both)	Age / dbh 15.90	0.73	Age / dbh 15.90	0.73	Age / dbh 19.90	1.00
V3	Understory / Midstory	Understory % 35.00 / Midstory % 20.00	1.00	Understory % 35.00 / Midstory % 20.00	1.00	Understory % 10.00 / Midstory % 20.00	0.70
V4	Hydrology	Flow/Exchange High / Flooding Duration Temporary	1.00	Flow/Exchange High / Flooding Duration Temporary	1.00	Flow/Exchange High / Flooding Duration Permanent	0.65
V5	Forest Size	Class 3.00	0.60	Class 3.00	0.60	Class 3.00	0.60
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh	28.00	0.36	28.00	0.36	28.00	0.36
	Abandoned Ag	0.00		0.00		0.00	
	Pasture / Hay	0.00		0.00		0.00	
	Active Ag	40.00		40.00		40.00	
	Development	32.00		32.00		32.00	
V7	Disturbance Type	Class	0.85	Class	0.85	Class	0.85
	Disturbance Distance	Class		Class		Class	
		HSI =	**0.82**	**HSI =**	**0.82**	**HSI =**	**0.76**

Intermediate Calculations

Understory/Midstory		
1.00	1.00	0.40
1.00	1.00	1.00
Hydrology		
1.00	1.00	0.65
0.00	0.00	0.00
0.00	0.00	0.00

Project: WSLP INDirect West BLH LOW Acres: 89.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age / dbh		Age / dbh		Age / dbh	
V3	Understory / Midstory	Understory % / Midstory %		Understory % / Midstory %		Understory % / Midstory %	
V4	Hydrology	Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh, Abandoned Ag, Pasture / Hay, Active Ag, Development						
V7	Disturbance Type / Disturbance Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Hydrology

Project: WSLP INDirect West BLH LOW Acres: 89.00

FWOP

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age / dbh		Age / dbh		Age / dbh	
V3	Understory / Midstory	Understory % / Midstory %		Understory % / Midstory %		Understory % / Midstory %	
V4	Hydrology	Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration		Flow/Exchange / Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh, Abandoned Ag, Pasture / Hay, Active Ag, Development						
V7	Disturbance Type / Disturbance Distance	Class		Class		Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Hydrology

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: WSLP INDirect West BLH LOW Acres: 89.00

Condition: Future With Project

Variable		TY Class/Value	0.00 SI	TY Class/Value	1.00 SI	TY Class/Value	50.00 SI
V1	Species Assoc.	Class 5.00	1.00	Class 5.00	1.00	Class 4.00	0.80
V2	Maturity (input age or dbh, not both)	Age / dbh 15.90	0.73	Age / dbh 15.90	0.73	Age / dbh 18.90	0.93
V3	Understory / Midstory	Understory % 35.00 / Midstory % 20.00	1.00	Understory % 35.00 / Midstory % 20.00	1.00	Understory % 10.00 / Midstory % 20.00	0.70
V4	Hydrology	Flow/Exchange High / Flooding Duration		Flow/Exchange High / Flooding Duration		Flow/Exchange Moderate / Flooding Duration	

Intermediate Calculations

Understory/Midstory		
1.00	1.00	0.40
1.00	1.00	1.00
Hydrology		
1.00	1.00	0.00
0.00	0.00	0.45

		Temporary	1.00	Temporary	1.00	Permanent	0.45	0.00	0.00	0.00
V5	Forest Size	Class 3.00	0.60	Class 3.00	0.60	Class 3.00	0.60			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	28.00	0.36	18.00	0.26	19.00	0.21			
	Abandoned Ag	0.00		0.00		0.00				
	Pasture / Hay	0.00		0.00		0.00				
	Active Ag	40.00		40.00		8.00				
	Development	32.00		42.00		73.00				
V7	Disturbance									
	Class	Class		Class		Class				
	Type		0.85		0.85		0.78			
	Class	Class		Class		Class				
	Distance									
		HSI = 0.82		**HSI = 0.80**		**HSI = 0.68**				

Project: WSLP INDirect West BLH LOW FWP

Acres: 89.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age dbh		Age dbh		Age dbh	
V3	Understory / Midstory	Understory % Midstory %		Understory % Midstory %		Understory % Midstory %	
V4	Hydrology	Flow/Exchange Flooding Duration		Flow/Exchange Flooding Duration		Flow/Exchange Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use Forest / marsh Abandoned Ag Pasture / Hay Active Ag Development	Values %		Values %		Values %	
V7	Disturbance Type Distance	Class Class		Class Class		Class Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Understory/Midstory

Hydrology

Project: WSLP INDirect West BLH LOW FWP

Acres: 89.00

Variable		TY Class/Value	SI	TY Class/Value	SI	TY Class/Value	SI
V1	Species Assoc.	Class		Class		Class	
V2	Maturity (input age or dbh, not both)	Age dbh		Age dbh		Age dbh	
V3	Understory / Midstory	Understory % Midstory %		Understory % Midstory %		Understory % Midstory %	
V4	Hydrology	Flow/Exchange Flooding Duration		Flow/Exchange Flooding Duration		Flow/Exchange Flooding Duration	
V5	Forest Size	Class		Class		Class	
V6	Surrounding Land Use Forest / marsh Abandoned Ag Pasture / Hay Active Ag Development	Values %		Values %		Values %	
V7	Disturbance Type Distance	Class Class		Class Class		Class Class	
		HSI =		**HSI =**		**HSI =**	

Intermediate Calculations

Hydrology

AAHU CALCULATION, Bottomland Hardwoods

Project: WSLP INDirect West BLH LOW

Future Without Project TY	Acres	x HSI	Total HUs	Cummulative HUs
0.00	89.00	**0.82**	73.02	
1.00	89.00	**0.82**	73.02	73.02
50.00	89.00	**0.76**	67.35	3439.02
MAX	50.00		**Total CHUs =**	**3512.03**
			AAHUs =	**70.24**

Future With Project TY	Acres	x HSI	Total HUs	Cummulative HUs
0.00	89.00	**0.82**	73.02	
1.00	89.00	**0.80**	71.45	72.24
50.00	89.00	**0.68**	60.30	3227.92
MAX	50.00		**Total CHUs =**	**3300.15**
			AAHUs =	**66.00**

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future Without Project AAHUs =	70.24
B. Future With Project AAHUs =	66.00
Net Change (FWP - FWOP) =	**-4.24**

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct NonStructural LOW Project Area: 1.10

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	20.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		64.00		64.00		55.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		46.00		46.00		35.00	
		Herbaceous		Herbaceous		Herbaceous	
		22.00		22.00		32.00	
		Class		Class		Class	
		4.00	0.60	4.00	0.60	4.00	0.60
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		15.76		16.66		19.51	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		138.77		116.24		155.70	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		13.97		14.57		16.47	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		109.00	0.99	164.00	1.00	165.00	1.00
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.45	Semi-Permanent	0.45	Semi-Permanent	0.45
V4	Salinity	Salinity		Salinity		Salinity	
		0.44	1.00	0.44	1.00	0.50	1.00
		HSI =	0.67	HSI =	0.68	HSI =	0.68

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
4.00	4.00	4.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.98	1.00	1.00
1.00	1.00	1.00
Tupelo/Cypress Basal Area		
0.99	1.00	1.00
Water Regime		
0.00	0.00	0.00
0.45	0.45	0.45
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	1.00

Project: WSLP Direct NonStructural LOW Project Area: 1.10

FWOP

Variable		TY	30.00	TY	50.00	TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		50.00		40.00			
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		33.00		30.00			
		Herbaceous		Herbaceous		Herbaceous	
		30.00		30.00			
		Class		Class		Class	
		4.00	0.60	2.00	0.20		
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		20.15		21.43			
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		167.81		198.49			
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		16.47		18.87			
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		177.00	1.00	140.00	1.00		
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low			
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.45	Permanent	0.30		
V4	Salinity	Salinity		Salinity		Salinity	
		0.44	1.00	0.50	1.00		
		HSI =	0.68	HSI =	0.43	HSI =	

Intermediate Calculations		
Class		
0.00	2.00	
0.00	0.00	
4.00	0.00	
0.00	0.00	
Tupelo/Cypress dbh		
0.00	0.00	0.00
1.00	1.00	0.00
1.00	1.00	0.00
Tupelo/Cypress Basal Area		
1.00	1.00	
Water Regime		
0.00	0.00	
0.45	0.30	
0.00	0.00	
Salinity		
1.00	1.00	0.00
1.00	1.00	0.00

Project: WSLP Direct NonStructural LOW Project Area: 1.10

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct NonStructural LOW Project Area: 1.10

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		64.00		0.00		0.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		46.00		0.00		0.00	
		Herbaceous		Herbaceous		Herbaceous	
		22.00		0.00		0.00	
		Class		Class		Class	
		4.00	0.60	1.00	0.10	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		15.76		0.00		0.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		138.77		0.00		0.00	

Intermediate Calculations		
Class		
0.00	1.00	1.00
0.00	0.00	0.00
4.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.98	0.00	0.00
1.00	0.00	0.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime		
Salinity		

Project: WSLP Direct NonStructural LOW FWP

Project Area: 1.10

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

Project: WSLP Direct NonStructural LOW FWP

Project Area: 1.10

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		

AAHU CALCULATION

Project: WSLP Direct NonStructural LOW

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	1.10	0.67	0.74	
1.00	1.10	0.68	0.74	0.74
20.00	1.10	0.68	0.74	14.11
30.00		0.68	0.00	3.71
50.00		0.43	0.00	0.00
			#VALUE!	
Max TY=	50.00		Total CHUs =	18.57
			AAHUs =	0.37

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	1.10	0.67	0.74	
1.00	0.00	0.00	0.00	0.25
50.00	0.00	0.00	0.00	0.00
Max TY=	50.00		Total CHUs =	0.25
			AAHUs =	0.00

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.00
B. Future Without Project AAHUs =	0.37
Net Change (FWP - FWOP) =	-0.37

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct NonStructural MED Project Area: 1.10

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	20.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		64.00		64.00		55.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		46.00		46.00		35.00	
		Herbaceous		Herbaceous		Herbaceous	
		22.00		22.00		32.00	
		Class		Class		Class	
		4.00	0.60	4.00	0.60	4.00	0.60
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		15.76		16.66		19.51	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		138.77		116.24		155.70	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		13.97		14.57		16.47	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		109.00	0.99	164.00	1.00	165.00	1.00
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.45	Semi-Permanent	0.45	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.44	1.00	0.44	1.00	0.50	1.00
		HSI =	0.67	HSI =	0.68	HSI =	0.60

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
4.00	4.00	4.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.98	1.00	1.00
1.00	1.00	1.00
Tupelo/Cypress Basal Area		
0.99	1.00	1.00
Water Regime		
0.00	0.00	0.00
0.45	0.45	0.30
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	1.00

Project: WSLP Direct NonStructural MED Project Area: 1.10

FWOP

Variable		TY	30.00	TY	50.00	TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		50.00		40.00			
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		33.00		30.00			
		Herbaceous		Herbaceous		Herbaceous	
		30.00		30.00			
		Class		Class		Class	
		4.00	0.60	2.00	0.20		
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		20.15		21.43			
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		167.81		198.49			
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		16.47		18.87			
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		177.00	1.00	140.00	1.00		
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low			
		Flooding Duration		Flooding Duration		Flooding Duration	
		Permanent	0.30	Permanent	0.30		
V4	Salinity	Salinity		Salinity		Salinity	
		0.44	1.00	0.50	1.00		
		HSI =	0.60	HSI =	0.43	HSI =	

Intermediate Calculations		
Class		
0.00	2.00	
0.00	0.00	
4.00	0.00	
0.00	0.00	
Tupelo/Cypress dbh		
0.00	0.00	0.00
1.00	1.00	0.00
1.00	1.00	0.00
Tupelo/Cypress Basal Area		
1.00	1.00	
Water Regime		
0.00	0.00	
0.30	0.30	
0.00	0.00	
Salinity		
1.00	1.00	0.00
1.00	1.00	0.00

Project: WSLP Direct NonStructural MED Project Area: 1.10

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct NonStructural MED Project Area: 1.10

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		64.00		0.00		0.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		46.00		0.00		0.00	
		Herbaceous		Herbaceous		Herbaceous	
		22.00		0.00		0.00	
		Class		Class		Class	
		4.00	0.60	1.00	0.10	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		15.76		0.00		0.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		138.77		0.00		0.00	

Intermediate Calculations		
Class		
0.00	1.00	1.00
0.00	0.00	0.00
4.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.98	0.00	0.00
1.00	0.00	0.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Direct NonStructural MED FWP

Project Area: 1.10

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Direct NonStructural MED FWP

Project Area: 1.10

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Direct NonStructural MED

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	1.10	0.67	0.74	
1.00	1.10	0.68	0.74	0.74
20.00	1.10	0.60	0.66	13.30
30.00		0.60	0.00	3.29
50.00		0.43	0.00	0.00
			#VALUE!	
Max TY=	50.00		Total CHUs =	17.33
			AAHUs =	0.35

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	1.10	0.67	0.74	
1.00	0.00	0.00	0.00	0.25
50.00	0.00	0.00	0.00	0.00
Max TY=	50.00		Total CHUs =	0.25
			AAHUs =	0.00

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.00
B. Future Without Project AAHUs =	0.35
Net Change (FWP - FWOP) =	-0.34

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct NonStructural HIGH Project Area: 1.10

Condition: Future Without Project

Variable		TY	0.00	TY	1.00	TY	20.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		64.00		64.00		55.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		46.00		46.00		35.00	
		Herbaceous		Herbaceous		Herbaceous	
		22.00		22.00		32.00	
		Class		Class		Class	
		4.00	0.60	4.00	0.60	4.00	0.60
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		15.76		16.66		19.51	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		138.77		116.24		155.70	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		13.97		14.57		16.47	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		109.00	0.99	164.00	1.00	165.00	1.00
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Moderate	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Semi-Permanent	0.45	Semi-Permanent	0.45	Permanent	0.45
V4	Salinity	Salinity		Salinity		Salinity	
		0.44	1.00	0.44	1.00	0.50	1.00
		HSI =	0.67	HSI =	0.68	HSI =	0.68

Intermediate Calculations		
Class		
0.00	0.00	0.00
0.00	0.00	0.00
4.00	4.00	4.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.98	1.00	1.00
1.00	1.00	1.00
Tupelo/Cypress Basal Area		
0.99	1.00	1.00
Water Regime		
0.00	0.00	0.00
0.45	0.45	0.45
0.00	0.00	0.00
Salinity		
1.00	1.00	1.00
1.00	1.00	1.00

Project: WSLP Direct NonStructural HIGH Project Area: 1.10

FWOP

Variable		TY	30.00	TY	50.00	TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		50.00		40.00			
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		33.00		30.00			
		Herbaceous		Herbaceous		Herbaceous	
		30.00		30.00			
		Class		Class		Class	
		4.00	0.60	2.00	0.20		
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		20.15		21.43			
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		167.81		198.49			
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		16.47		18.87			
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		177.00	1.00	140.00	1.00		
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Moderate		Moderate			
		Flooding Duration		Flooding Duration		Flooding Duration	
		Permanent	0.45	Permanent	0.45		
V4	Salinity	Salinity		Salinity		Salinity	
		0.44	1.00	0.50	1.00		
		HSI =	0.68	HSI =	0.49	HSI =	

Intermediate Calculations		
Class		
0.00	2.00	
0.00	0.00	
4.00	0.00	
0.00	0.00	
Tupelo/Cypress dbh		
0.00	0.00	0.00
1.00	1.00	0.00
1.00	1.00	0.00
Tupelo/Cypress Basal Area		
1.00	1.00	
Water Regime		
0.00	0.00	
0.45	0.45	
0.00	0.00	
Salinity		
1.00	1.00	0.00
1.00	1.00	0.00

Project: WSLP Direct NonStructural HIGH Project Area: 1.10

FWOP

Variable		TY		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		Herbaceous		Herbaceous		Herbaceous	
		Class		Class		Class	
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Flooding Duration		Flooding Duration		Flooding Duration	
V4	Salinity	Salinity		Salinity		Salinity	
		HSI =		HSI =		HSI =	

Intermediate Calculations		
Class		
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress Basal Area		
Water Regime		
Salinity		
0.00	0.00	0.00
0.00	0.00	0.00

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Swamp

Project: WSLP Direct NonStructural HIGH Project Area: 1.10

Condition: Future With Project

Variable		TY	0.00	TY	1.00	TY	50.00
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		64.00		0.00		0.00	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		46.00		0.00		0.00	
		Herbaceous		Herbaceous		Herbaceous	
		22.00		0.00		0.00	
		Class		Class		Class	
		4.00	0.60	1.00	0.10	1.00	0.10
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		15.76		0.00		0.00	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		138.77		0.00		0.00	

Intermediate Calculations		
Class		
0.00	1.00	1.00
0.00	0.00	0.00
4.00	0.00	0.00
0.00	0.00	0.00
Tupelo/Cypress dbh		
0.00	0.00	0.00
0.98	0.00	0.00
1.00	0.00	0.00
Tupelo/Cypress Basal Area		

		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Water Regime
Salinity

Project: WSLP Direct NonStructural HIGH FWP

Project Area: 1.10

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

Project: WSLP Direct NonStructural HIGH FWP

Project Area: 1.10

		TY					
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	

Intermediate Calculations
Class
Tupelo/Cypress dbh
Tupelo/Cypress Basal Area
Water Regime
Salinity

AAHU CALCULATION

Project: WSLP Direct NonStructural HIGH

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	1.10	0.67	0.74	
1.00	1.10	0.68	0.74	0.74
20.00	1.10	0.68	0.74	14.11
30.00		0.68	0.00	3.71
50.00		0.49	0.00	0.00
			#VALUE!	
Max TY=	50.00		Total CHUs =	18.57
			AAHUs =	0.37

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0.00	1.10	0.67	0.74	
1.00	0.00	0.00	0.00	0.25
50.00	0.00	0.00	0.00	0.00
Max TY=	50.00		Total CHUs =	0.25
			AAHUs =	0.00

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.00
B. Future Without Project AAHUs =	0.37
Net Change (FWP - FWOP) =	-0.37

EAST and Central	Existing Water Depth (ft NAVD88) (based on LIDAR)	Relative Sea Level Rise (ft NAVD88) (provided by the Corps)	Total Water Depth (ft NAVD88)	Baldcypress Growth Factor	Change btw FWP FWOP GF	Change btw FWP FWOP RSLR
FWOP Low	0.8775	1.81	2.69	-1.5	0.2	0.4
FWP Low	0.8775	2.21	3.09	-1.7		
FWOP Med	0.8775	2.32	3.20	-1.7	0.3	0.5
FWP Med	0.8775	2.82	3.70	-1.9		
FWOP High	0.8775	3.95	4.83	-2.6	0.4	0.9
FWP High	0.8775	4.85	5.73	-3.5		
WEST						
FWOP Low	0.984	1.81	2.79	-1.5	0.2	0.4
FWP Low	0.984	2.21	3.19	-1.7		
FWOP Med	0.984	2.32	3.30	-1.8	0.3	0.5
FWP Med	0.984	2.82	3.80	-2.0		
FWOP High	0.984	3.95	4.93	-2.6	0.5	0.9
FWP High	0.984	4.85	5.83	-3.6		

	EAST	WEST
	Water levels above surface elevation (NAVD 88 Feet)	
Year	CRMS0059	CRMS5373
2007	0.61	
2008	0.17	0.05
2009		-0.14
2010	0.34	0.28
2011	0.19	-0.1
2012		0.33
Average water depth	0.3275	0.084
mean marsh elevation at CRMS station	0.95	1.2

water levels from lidar surface elevations (NAVD 88 feet) and crms water depth (NAVD88 feet).

mean marsh ele	0.4	0.3
Year	CRMS0059	CRMS5373
2007	1.16	
2008	0.72	0.95
2009		0.76
2010	0.89	1.18
2011	0.74	0.8
2012		1.23
Average water depth	**0.8775**	**0.984**

DIRECT EAST SWAMP

	TOTAL Direct East Swamp				MED RSLR		High RSLR	
	TY 1.0		FWOP (1.5) TY50		FWOP (1.7) TY50		FWOP (2.6) TY50	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	17.0	53.2	15.0	338.9	14.4	331.8	15.9	308.5
cypress	4.2	13.3	4.7	107.0	4.6	104.8	4.2	81.2
other	12.7	39.9	10.2	231.9	9.9	227.0	11.7	227.3
# of trees								
0								

DIRECT CENTRAL SWAMP

	TOTAL Direct CENTRAl Swamp				MED RSLR		High RSLR	
	TY 1.0		FWOP (1.5) TY50		FWOP (1.7) TY50		FWOP (2.6) TY50	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	15.0	205.5	13.9	421.6	12.9	380.3	12.5	233.0
cypress	7.5	102.7	6.2	189.0	5.8	170.5	6.8	127.1
other	7.5	102.7	7.7	232.6	7.1	209.8	5.9	110.1
# of trees								
0								

DIRCET WEST SWAMP

	TOTAL Direct West Swamp Low SLR		Med RSLR		High RSLR	
	TY 1.0		FWOP (-1.5) TY50		FWOP (-1.8) TY50		FWOP (-2.6) TY50	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	20.6	2876.2	22.6	4560.7	21.1	4160.7	20.6	3213.5
cypress	3.8	536.9	5.0	1001.8	4.6	913.9	3.9	609.1
other	16.8	2339.3	17.6	3558.9	16.4	3246.8	16.7	2604.4
# of trees								

INDIRECT EAST SWAMP

	TOTAL Indirect East Swamp Low RSLR		Low RSLR		Med RSLR		Med RSLR		High RSLR		High RSLR	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	13.6	91.6	10.8	200.8	9.8	178.2	9.8	178.2	8.8	157.2	12.1	100.9	8.5	55.4
cypress	2.3	15.3	1.6	29.3	1.4	26.0	0.8	15.2	1.3	22.9	1.8	14.7	1.2	8.1
other	11.3	76.3	9.3	171.6	8.4	152.2	8.6	155.5	7.5	134.3	10.3	86.1	7.3	47.3
# of trees														
	%other	0.8	%other	0.9	%other	0.9	%other	0.9	%other	0.9	%other	0.9	%other	0.9
	Class	6.0	Class											

Plot W25

	TY 1.0		FWOP (1.5) 50.0		FWOP (1.7) 50.0		FWOP (2.6) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	16.0	52.8	19.0	554.4	19.0	554.4	19.0	554.4
9.0	tot	9.0	tot	26.0	tot	26.0	tot	14.0
	cypres	2.0	cypress	6.0	cypress	6.0	cypress	3.0
	other	7.0	other	20.0	other	20.0	other	11.0
	Forest % c	25.0						
	Mid % cov	50.0						
	Herb % cov	10.0						

Plot NW4

	TY 1.0		FWOP (1.5) 50.0		FWOP (1.7) 50.0		FWOP (2.6) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	9.2	67.7	9.6	216.9	8.6	180.8	7.2	66.9
14.0	tot	14.0	tot	35.0	tot	35.0	tot	20.0
	cypres	1.0	cypres	6.0	cypres	6.0	cypres	5.0
	other	13.0	other	29.0	other	29.0	other	15.0
	Forest % c	69.0						
	Mid % cov	45.0						
	Herb % cov	10.0						

Plot NW9

	TY 1.0		FWOP (-1.5) 50.0		FWOP (-1.8) 50.0		FWOP (-2.6) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	14.6	210.2	11.4	425.5	9.9	359.6	12.8	227.5
26.0	tot	14.0	tot	37.0	tot	37.0	tot	17.0
14.0	cypres	6.0	cypres	16.0	cypres	16.0	cypres	7.0
	other	8.0	other	21.0	other	21.0	other	10.0
	Forest % c	66.7						
	Mid % cov	35.0						
	Herb % cov	10.0						

37.0
5.0

Plot NW14

	TY 1.0		FWOP (-1.5) 50.0		FWP (1.7) 50.0		FWOP (-1.7) 50.0		FWP (1.9) 50.0		FWOP (-2.6) 50.0		FWP (3.5) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	14.9	74.2	10.3	160.7	9.3	142.5	9.3	142.5	8.3	125.7	11.7	82.8	8.9	48.9
	tot	5.0	tot	17.0	tot	17.0	tot	17.0	tot	17.0	tot	7.0	tot	6.0
	cypres	1.0	cypres	3.0	cypres	3.0	cypres	3.0	cypres	3.0	cypres	1.0	cypres	1.0
	other	4.0	other	14.0	other	14.0	other	14.0	other	14.0	other	6.0	other	5.0
	Forest % cc	69.7												
	Mid % cove	60.0												
	Herb % cov	57.5												

Plot NW1

	TY 1.0		FWOP (1.5) 50.0		FWOP (1.7) 50.0		FWOP (2.6) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	18.0	53.6	10.9	123.3	9.9	109.2	12.9	62.5
3.0	tot	3.0	tot	12.0	tot	12.0	tot	5.0
	cypres	1.0	cypres	6.0	cypres	6.0	cypres	2.0
	other	2.0	other	6.0	other	6.0	other	3.0
	Forest % c	78.0						
	Mid % cov	45.0						
	Herb % cov	80.0						

Plot NW5

	TY 1.0		FWOP (1.5) 50.0		FWOP (1.7) 50.0		FWOP (2.6) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	15.9	181.0	13.2	371.8	12.2	335.1	13.3	206.3
11.0	tot	11.0	tot	26.0	tot	26.0	tot	15.0
	cypres	4.0	cypres	10.0	cypres	10.0	cypres	6.0
	other	7.0	other	16.0	other	16.0	other	9.0
	Forest % c	66.3						
	Mid % cov	50.0						
	Herb % cov	10.0						

12.0
136.0

CRMS5373

	TY 1.0		FWOP (-1.5) 50.0		FWOP (-1.8) 50.0		FWOP (-2.6) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	26.6	5542.1	33.7	8695.8	32.2	7961.8	28.3	6199.5
	Forest % c	11.4						
	Mid % cover							
	Herb % cov	8.8						

136.0
11.0

Plot NW2

	TY 1.0		FWOP (-1.5) 50.0		FWP (1.7) 50.0		FWOP (-1.7) 50.0		FWP (1.9) 50.0		FWOP (-2.6) 50.0		FWP (3.5) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	15.4	160.9	13.6	339.9	12.5	305.0	12.5	305.0	11.5	272.8	11.2	179.4	10.3	101.4
	tot	11.0	tot	24.0	tot	24.0	tot	24.0	tot	24.0	tot	17.0	tot	12.0
	cypres	2.0	cypres	4.0	cypres	4.0	cypres	4.0	cypres	4.0	cypres	3.0	cypres	2.0
	other	9.0	other	20.0	other	20.0	other	20.0	other	20.0	other	14.0	other	10.0
	Forest % cc	77.3												
	Mid % cove	55.0												
	Herb % cov	50.0												

TOTAL Direct East Swamp

	TY 1.0		FWOP (1.5) 50.0		FWOP (1.7) 50.0		FWOP (2.6) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
15.0	17.0	53.2	15.0	338.9	14.4	331.8	15.9	308.5
	tot	12.0	tot	38.0	tot	38.0	tot	19.0
	cypres	3.0	cypres	12.0	cypres	12.0	cypres	5.0
	other	9.0	other	26.0	other	26.0	other	14.0
	Forest % c	51.5		class 6		class 6		class 6
	Mid % cov	47.5						
	Herb % cov	45.0						

Plot NW8

	TY 1.0		FWOP (1.5) 50.0		FWOP (1.7) 50.0		FWOP (2.6) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	19.8	367.7	18.8	676.2	17.8	625.0	17.2	425.7
14.0	tot	19.0	tot	26.0	tot	26.0	tot	20.0
	cypres	17.0	cypres	23.0	cypres	23.0	cypres	19.0
	other	2.0	other	3.0	other	3.0	other	2.0
	Forest % c	70.0						
	Mid % cov	5.0						
	Herb % cov	55.0						

TOTAL Direc CENTRAL Swamp

	TY 1.0		FWOP (1.5) 50.0		FWOP (1.7) 50.0		FWOP (2.6) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	15.0	205.5	13.9	421.6	12.9	380.3	12.5	233.0
11.0	tot	44.0	tot	87.0	tot	87.0	tot	55.0
	cypres	22.0	cypres	39.0	cypres	39.0	cypres	30.0
	other	22.0	other	48.0	other	48.0	other	26.0
	Forest % c	68.4		class 6		class 6		class 6
	Mid % cov	33.3						
	Herb % cov	25.0						

TOTAL Direct West Swamp

	TY 1.0		FWOP (-1.5) 50.0		FWOP (-1.8) 50.0		FWOP (-2.6) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	20.6	2876.2	22.6	4560.7	21.1	4160.7	20.6	3213.5
	tot	150.0	tot	173.0	tot	173.0	tot	153.0
	cypres	28.0	cypres	38.0	cypres	38.0	cypres	29.0
	other	122.0	other	135.0	other	135.0	other	124.0
	Forest % c	39.0		class 3		class 3		class 3
	Mid % cov	35.0						
	Herb % cov	9.4						

#REF!

Plot FR1

	TY 1.0		FWOP (-1.5) 50.0		FWP (1.7) 50.0		FWOP (-1.7) 50.0		FWP (1.9) 50.0		FWOP (-2.6) 50.0		FWP (3.5) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	8.7	22.0	9.5	72.1	8.4	59.7	8.4	59.7	7.4	49.1	7.7	21.2	3.0	5.0
	tot	5.0	tot	12.0	tot	12.0	tot	12.0	tot	12.0	tot	6.0	tot	6.0
	cypres	0.0	cypres	0.0	cypres	0.0	cypres	0.0	cypres	0.0	cypres	0.0	cypres	0.0
	other	5.0	other	12.0	other	12.0	other	12.0	other	12.0	other	6.0	other	6.0
	Forest % cc	87.0												
	Mid % cove	60.0												
	Herb % cov	45.0												

#REF!

Plot FR2

	TY 1.0		FWOP (-1.5) 50.0		FWP (1.7) 50.0		FWOP (-1.7) 50.0		FWP (1.9) 50.0		FWOP (-2.6) 50.0		FWP (3.5) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	14.8	143.9	11.8	309.9	10.8	276.5	10.8	276.5	9.8	244.9	15.4	159.4	10.5	84.2
	tot	11.0	tot	27.0	tot	27.0	tot	27.0	tot	27.0	tot	11.0	tot	11.0
	cypres	3.0	cypres	7.0	cypres	7.0	cypres	7.0	cypres	7.0	cypres	3.0	cypres	3.0
	other	8.0	other	20.0	other	20.0	other	20.0	other	20.0	other	8.0	other	8.0
	Forest % cc	60.3												
	Mid % cove	20.0												
	Herb % cov	25.0												

#REF!

Plot FR3

	TY 1.0		FWOP (-1.5) 50.0		FWP (1.7) 50.0		FWOP (-1.7) 50.0		FWP (1.9) 50.0		FWOP (-2.6) 50.0		FWP (3.5) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	14.2	57.1	9.1	121.6	8.1	107.3	8.1	107.3	7.0	93.7	14.5	61.5	9.7	37.2
	tot	4.0	tot	16.0	tot	16.0	tot	16.0	tot	16.0	tot	4.0	tot	4.0
	cypres	0.0	cypres	0.0	cypres	0.0	cypres	0.0	cypres	0.0	cypres	0.0	cypres	0.0
	other	4.0	other	16.0	other	16.0	other	16.0	other	16.0	other	4.0	other	4.0
	Forest % cc	92.5												
	Mid % cove	65.0												
	Herb % cov	80.0												

#REF!

TOTAL Indirect East Swamp

	TY 1.0		FWOP (-1.5) 50.0		FWP (1.7) 50.0		FWOP (-1.7) 50.0		FWP (1.9) 50.0		FWOP (-2.6) 50.0		FWP (3.5) 50.0	
	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
	13.6	91.6	10.8	200.8	9.8	178.2	9.8	178.2	8.8	157.2	12.1	100.9	8.5	55.4
	tot	36.0	tot	96.0	tot	96.0	tot	96.0	tot	96.0	tot	45.0	tot	39.0

#REF!
19.0
#REF!
#REF!
12.0
0.25
0.75
44.0
0.5
0.5
38.0
0.315789
0.684211
5.0

INDIRECT CENTRAL SWAMP

TOTAL Indirect CENTRAL Swamp Low RSLR		Low RSLR		Med RSLR		Med RSLR		High RSLR		High RSLR	
TY 1.0		FWOP (1.5) TY50		FWP (1.7) TY50		FWOP (1.7) TY50		FWP (1.9) TY50		FWOP (2.6) TY50		FWP (3.5) TY50	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
15.8	1083.8	14.2	2201.4	13.2	1970.9	13.2	1970.9	12.2	1774.8	12.2	1142.5	10.5	509.8
cypress 0.8	54.6	1.0	158.3	0.9	141.8	1.1	168.3	0.9	127.7	0.9	82.2	0.8	36.7
other 15.0	1029.2	13.2	2043.0	12.2	1829.1	11.5	1720.3	11.3	1647.1	11.3	1060.3	9.8	473.1
# of trees tot	377.0	tot	431.0	tot	431.0	tot	431.0	tot	431.0	tot	395.0	tot	379.0
cypres	19.0	cypres	31.0	cypres	31.0	cypres	31.0	cypres	31.0	cypres	23.0	cypres	19.0
other	358.0	other	400.0	other	400.0	other	400.0	other	400.0	other	372.0	other	360.0
Forest % c	67.9												
Mid % cove	45.0												
Herb % cov	60.8												
%cypres	0.1	%cypres	0.1	%cypres	0.1	%cypres	0.1	%cypres	0.1	%cypres	0.1	%cypres	0.1
%other	0.9	%other	0.9	%other	0.9	%other	0.9	%other	0.9	%other	0.9	%other	0.9
Class	6.0	Class											

INDIRCET WEST SWAMP

TOTAL Indirect West Swamp Low RSLR		Low RSLR		Med RSLR		Med RSLR		High RSLR		High RSLR	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
21.3	2833.9	21.4	4503.8	20.4	4236.3	19.9	4106.7	18.9	3872.4	20.1	3172.2	15.8	2180.2
cypress 3.9	511.7	5.3	1107.1	5.0	1041.3	4.9	1009.5	4.7	951.9	4.9	779.7	3.9	535.9
other 17.5	2322.2	16.3	3421.9	15.5	3218.7	15.1	3120.2	14.4	2942.2	15.2	2410.1	12.0	1656.5
# of trees													
%cypres	0.2	%cypres	0.2										
%other	0.8	%other	0.8										
Class	3.0	Class											

DIRECT BLH

TOTAL Direct BLH Low RSLR		Med RSLR		High RSLR	
TY 1.0		FWOP (0.3) TY50		FWOP (0.1) TY50		FWOP (-0.1) TY50	
DBH	BA	DBH	BA	DBH	BA	DBH	BA
14.5	87.7	21.3	501.6	20.2	458.8	19.2	420.1
tot	22.0	tot	54.0	tot	54.0	tot	54.0
Forest % c	71.9						
Mid % cov	72.5						
Herb % cov	51.7						

INDIRE

TOTAL Indirect	
TY 1.0	
DBH	BA
15.9	163.9
tot	31.0
Forest % c	67.2
Mid % cov	20.0
Herb % cov	35.0

Plot NW3

TY 1.0		FWOP (1.5) 50.0		FWP (1.7) 50.0		FWOP (1.7) 50.0		FWP (1.9) 50.0		FWOP (2.6) 50.0		FWP (3.5) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
13.1	66.6	9.6	156.4	8.6	136.2	8.6	136.2	7.6	117.9	8.1	72.0	6.6	41.5
tot	5.0	tot	20.0	tot	20.0	tot	20.0	tot	20.0	tot	10.0	tot	6.0
cypres	1.0	cypres	4.0	cypres	4.0	cypres	4.0	cypres	4.0	cypres	2.0	cypres	1.0
other	4.0	other	16.0	other	16.0	other	16.0	other	16.0	other	8.0	other	5.0
Forest % c	63.3												
Mid % cove	20.0												
Herb % cov	15.0												

Plot NW10

TY 1.0		FWOP (-1.5) 50.0		FWP (1.7) 50.0		FWOP (-1.8) 50.0		FWP (2.0) 50.0		FWOP (-2.6) 50.0		FWP (3.6) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
16.1	125.6	9.1	311.7	8.0	269.9	7.5	251.5	6.5	218.1	11.8	144.8	8.3	76.2
tot	8.0	tot	43.0	tot	43.0	tot	43.0	tot	43.0	tot	13.0	tot	11.0
cypres	4.0	cypres	22.0	cypres	22.0	cypres	22.0	cypres	22.0	cypres	6.0	cypres	5.0
other	4.0	other	22.0	other	22.0	other	22.0	other	22.0	other	7.0	other	6.0
Forest % c	51.7												
Mid % cov	50.0												
Herb % cov	10.0												

Plot NW11

TY 1.0		FWOP (0.3) 50.0		FWOP (0.1) 50.0		FWOP (-0.1) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA
16.4	124.6	21.4	660.2	20.3	605.1	19.3	556.4
tot	8.0	tot	23.0	tot	23.0	tot	23.0
Forest % c	50.0						
Mid % cov	50.0						
Herb % cov	45.0						

Plot NW6

TY 1.0		FWOP (1.5) 50.0		FWP (1.7) 50.0		FWOP (1.7) 50.0		FWP (1.9) 50.0		FWOP (2.6) 50.0		FWP (3.5) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
19.5	185.7	11.0	378.6	9.9	337.7	9.9	337.7	8.9	302.7	13.1	208.1	15.3	125.9
tot	8.0	tot	34.0	tot	34.0	tot	34.0	tot	34.0	tot	14.0	tot	8.0
cypres	2.0	cypres	7.0	cypres	7.0	cypres	7.0	cypres	7.0	cypres	3.0	cypres	2.0
other	6.0	other	27.0	other	27.0	other	27.0	other	27.0	other	11.0	other	6.0
Forest % c	72.7												
Mid % cove	40.0												
Herb % cov	100.0												

CRMS5373

TY 1.0		FWOP (-1.5) 50.0		FWP (1.7) 50.0		FWOP (-1.8) 50.0		FWP (2.0) 50.0		FWOP (-2.6) 50.0		FWP (3.6) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
26.6	5542.1	33.7	8695.8	32.7	8202.8	32.2	7961.8	31.3	7526.7	28.3	6199.5	23.3	4284.3
tot	136.0	tot	136.0	tot	136.0	tot	136.0	tot	136.0	tot	136.0	tot	136.0
cypres	22.0	cypres	22.0	cypres	22.0	cypres	22.0	cypres	22.0	cypres	22.0	cypres	22.0
other	114.0	other	114.0	other	114.0	other	114.0	other	114.0	other	114.0	other	114.0
Forest % c	11.4												
Mid % cover													
Herb % cov	8.8												

#REF!

Plot NW12

TY 1.0		FWOP (0.3) 50.0		FWOP (0.1) 50.0		FWOP (-0.1) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA
16.1	74.8	21.4	401.1	20.4	368.1	19.3	337.7
tot	5.0	tot	14.0	tot	14.0	tot	14.0
Forest % c	90.7						
Mid % cov	87.5						
Herb % cov	30.0						

Plot NW7

TY 1.0		FWOP (1.5) 50.0		FWP (1.7) 50.0		FWOP (1.7) 50.0		FWP (1.9) 50.0		FWOP (2.6) 50.0		FWP (3.5) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
16.9	306.6	16.8	621.6	15.7	563.6	15.7	563.6	14.7	512.1	13.8	353.3	11.9	188.5
tot	18.0	tot	31.0	tot	31.0	tot	31.0	tot	31.0	tot	25.0	tot	19.0
cypres	5.0	cypres	9.0	cypres	9.0	cypres	9.0	cypres	9.0	cypres	7.0	cypres	5.0
other	13.0	other	22.0	other	22.0	other	22.0	other	22.0	other	18.0	other	14.0
Forest % c	88.3												
Mid % cove	75.0												
Herb % cov	90.0												

TOTAL Indirect West Swamp

TY 1.0		FWOP (-1.5) 50.0		FWP (1.7) 50.0		FWOP (-1.8) 50.0		FWP (2.1) 50.0		FWOP (-2.6) 50.0		FWP (3.1) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
21.3	2833.9	21.4	4503.8	20.4	4236.3	19.9	4106.7	18.9	3872.4	20.1	3172.2	15.8	2180.2
tot	144.0	tot	179.0	tot	179.0	tot	179.0	tot	179.0	tot	149.0	tot	147.0
cypres	26.0	cypres	44.0	cypres	44.0	cypres	44.0	cypres	44.0	cypres	28.0	cypres	27.0
other	118.0	other	136.0	other	136.0	other	136.0	other	136.0	other	121.0	other	120.0
Forest % c	31.5		class 3		class 3		class 3		class 3		class 3		class 3
Mid % cov	50.0												
Herb % cov	9.4												

Plot NW13

TY 1.0		FWOP (0.3) 50.0		FWOP (0.1) 50.0		FWOP (-0.1) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA
11.1	63.7	21.0	443.6	20.0	403.1	18.9	366.1
tot	9.0	tot	17.0	tot	17.0	tot	17.0
Forest % c	75.0						
Mid % cov	80.0						
Herb % cov	80.0						

CRMS0059

TY 1.0		FWOP (1.5) 50.0		FWP (1.7) 50.0		FWOP (1.7) 50.0		FWP (1.9) 50.0		FWOP (2.6) 50.0		FWP (3.5) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
13.4	3776.4	19.6	7649.0	18.5	6846.0	18.5	6846.0	17.5	6166.5	13.7	3936.5	8.2	1683.2
										tot	346.0	tot	346.0
										cypres	11.0	cypres	11.0
										other	335.0	other	335.0
Herb % cov	47.3												
Mid % cover													
Forest % cc	38.3												

TOTAL Direct BLH

TY 1.0		FWOP (0.3) 50.0		FWOP (0.1) 50.0		FWOP (-0.1) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA
14.5	87.7	21.3	501.6	20.2	458.8	19.2	420.1
tot	22.0	tot	54.0	tot	54.0	tot	54.0
Forest % c	71.9		class 6		class 6		class 6
Mid % cov	72.5						
Herb % cov	51.7						

TOTAL Indirect CENTRAL Swamp

TY 1.0		FWOP (1.5) 50.0		FWP (1.7) 50.0		FWOP (1.7) 50.0		FWP (1.9) 50.0		FWOP (2.6) 50.0		FWP (3.5) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
15.8	1083.8	14.2	2201.4	13.2	1970.9	13.2	1970.9	12.2	1774.8	12.2	1142.5	10.5	509.8
Forest % cc	67.9		class 6										
Mid % cove	45.0												
Herb % cov	60.8												

C2 50 to 500ft	Acres	Percent of total
Ag land	63.0	23.0
Residental	48.9	17.9
Rail Road	2.2	0.8
500Ft Buffe	273.2	
Residental	20.2956	28.6384

:CT BLH

BLH Low RSLR		Low RSLR		Med RSLR		Med RSLR		High RSLR		High RSLR	
FWOP (0.3) TY50		FWP (0.1) TY50		FWOP (0.1) TY50		FWP (0.1) TY50		FWOP (0.1) TY50		FWP (0.3) TY50	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
22.0	786.7	20.9	724.6	20.9	724.6	19.9	665.5	19.9	665.5	18.9	609.2
tot	77.0	tot	77.0	tot	77.0	tot	77.0	tot	77.0	tot	77.0

NW15

FWOP (0.3) 50.0		FWP (01.) 50.0		FWOP (0.1) 50.0		FWP (0.1) 50.0		FWOP (0.1) 50.0		FWP (0.3) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
23.1	898.7	22.1	830.2	22.1	830.2	21.0	765.3	21.0	765.3	20.0	703.0
tot	27.0	tot	27.0	tot	27.0	tot	27.0	tot	27.0	tot	27.0

NW16

FWOP (0.3) 50.0		FWP (01.) 50.0		FWOP (0.1) 50.0		FWP (0.1) 50.0		FWOP (0.1) 50.0		FWP (0.3) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
21.7	840.7	20.7	774.1	20.7	774.1	19.6	710.4	19.6	710.4	18.6	649.9
tot	28.0	tot	28.0	tot	28.0	tot	28.0	tot	28.0	tot	28.0

NW17

FWOP (0.3) 50.0		FWP (01.) 50.0		FWOP (0.1) 50.0		FWP (0.1) 50.0		FWOP (0.1) 50.0		FWP (0.3) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
21.1	620.6	20.1	569.5	20.1	569.5	19.1	520.9	19.1	520.9	18.0	474.5
tot	22.0	tot	22.0	tot	22.0	tot	22.0	tot	22.0	tot	22.0

direct BLH

FWOP (0.3) 50.0		FWP (01.) 50.0		FWOP (0.1) 50.0		FWP (0.1) 50.0		FWOP (0.1) 50.0		FWP (0.3) 50.0	
DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
22.0	786.7	20.9	724.6	20.9	724.6	19.9	665.5	19.9	665.5	18.9	609.2
tot	77.0	tot	77.0	tot	77.0	tot	77.0	tot	77.0	tot	77.0
	class 6		class 6		class 6		class 6		class 6		class 6

C2 50 to 500ft	Acres	C2 50 to 500ft	Acres	Percent of total	Percent of total
Ag land		Ag land			
Residental		Residental			
Rail Road		Rail Road			
500Ft Buffer		500Ft Buffer			
Residental		Residental			

		Acers	Field sites used
Direct swamp	East	253	W25, NW1
	Central	540	NW4, NW5, NW8
	West	319	NW9, CRMS5373
Total Direct swamp		**1112**	
Indirect Swamp	East	2325	NW2, NW14, FR1, FR2, FR3
	Central	4383	NW3, NW6, NW7, CRMS0059
	West	1724	NW10, CRMS5373
Total Indirect Swamp		**8432**	
Indirect BLH no impact		366	
Indirect BLH with impacts		89	NW15, NW16, NW17
Direct BLH		123	NW11, NW12, NW13
NonStructural Swamp		1.1	

208

NW2, NW14, FR1, FR2, FR3

Type Mast Producing Tree	Direct BLH Site NW11	NW12	NW13	Average
hard-mast	0	25	0	8
soft-mast	95	75	100	90
non-mast	5	0	0	2
	Class 4	Class 5	Class 4	Class 4

Type Mast Producing Tree	Indirect BLH Site NW15	NW16	NW17	Average
hard-mast	30	50	60	47
soft-mast	70	50	40	53
non-mast	0	0	0	0
	Class 5	Class 5	Class 5	Class 5

Direct

Wooded	Levee	Open Wate	AgLand	Buffer	NonHabitat
82.3	82.2	171.1	75.3	1582.8	542.4
9.8			260.4		
79.7					
111.2					
38.3					
33.8					
4.2					
45.3					
16.0					
8.5					
22.4					
Total 451.5	82.2	171.1	335.6	1582.8	542.4
Percent% 0.29	0.05	0.11	0.21	1.00	0.34

Direct

Buffer Acres	Wooded	Open Wate	AgLand	NonHabita	Levee	Wooded w/o Levee	Nonhabitat w levee
2790	9	229	268	1059	62	524	1158
2790	17		1		37		
	117		10				
	3		258				
	4		85				
	85		258				
	56						
	271						
	5						
	22						
	34						
Total	623	229	879	1059	99	524	
Percent%	0.22	0.08	0.32	0.38	0.04	0.19	
If used only *area	801			881			
Percent%	0.29	0.08	0.32	0.32	0.04	0.19	0.42

V6 DIRECT TY0 and FWOP TY1 and TY50	Percent	Weight Factor	Weight Percent
Wooded	34	1	33.72
Ag & Openwater	32	0.2	6.40
Nonhabitat	34	0	0.00
	100	**SI**	**0.40**

V6 DIRECT FWP TY1	Percent	Weight Factor	Weight Percent
Wooded	29	1	28.52
Ag & Openwater	32	0.2	6.40
Nonhabitat	39	0	0.00
	100	**SI**	**0.35**

V6 DIRECT FWP TY50	Percent	Weight Factor	Weight Percent
Wooded	29	1	28.52
Openwater	11	0.2	2.16
Nonhabitat	61	0	0.00
	100	**SI**	**0.31**

V6 FWOP TY50	Percent	Weight Factor	Weight Percent
Wooded	34	1	33.72
Openwater	11	0.2	2.16
Nonhabitat	55	0	0.00
	100	**SI**	**0.36**

V7-Disterbance DIRECT (Baseline TY0, TY1, and FWOP TY50)				
Class 2 - 50 to 500ft	Acres	Percent of total area	SI	% X SI
Ag land	63.0	0.23	0.65	0.15
Residental and Railroad	51.2	0.19	0.5	0.09
Rest	159.1	0.58	1	0.58
Tot 500Ft Buffer	273.2		**Wt Avg %**	**0.83**

V7-Disterbance DIRECT (FWP TY50)				
Class 2 - 50 to 500ft	Acres	Percent of total area	SI	% X SI
Ag land	0.0	0.00	0.65	0.00
Residental and Railroad	114.1	0.42	0.5	0.21
Rest	159.1	0.58	1	0.58
Tot 500Ft Buffer	273.2		**Wt Avg %**	**0.79**

DIRECT		
Residental	20.2956	28.6384
Rail Road	2.2	
Ag land	63.0	

V6 INDIRECT (TY0) and FWOP TY1 and TY50	Percent	Weight Factor	Weight Percent
Wooded	29	1	28.72
Ag & Openwater	40	0.2	7.94
Nonhabitat	32	0	0.00
	100	**SI**	**0.37**

V6 INDIRECT FWP TY1	Percent	Weight Factor	Weight Percent
Wooded	19	1	18.79
Ag & Openwater	40	0.2	7.94
Nonhabitat	42	0	0.00
	100	**SI**	**0.27**

V6 INDIRECT FWP TY50	Percent	Weight Factor	Weight Percent
Wooded	19	1	18.79
Openwater	8	0.2	1.64
Nonhabitat	73	0	0.00
	100	**SI**	**0.20**

V7-Disterbance INDIRECT (Baseline TY0, TY1, and FWOP TY50)				
50 to 500ft	Acres	of total area	SI	% X SI
Ag land	22.8	0.06	0.65	0.04
Residental and Rest	99.5	0.25	0.5	0.13
	271.8	0.69	1	0.69
Tot 500Ft	394.1		**Wt Avg %**	**0.85**

V7-Disterbance INDIRECT (FWP TY50)				
50 to 500ft	Acres	of total area	SI	% X SI
Ag land	0.0	0.00	0.65	0.00
Residental and Railroad	122.2	0.45	0.5	0.22
Rest	151.0	0.55	1	0.55
Tot 500Ft	273.2		**Wt Avg %**	**0.78**

INDIRECT		
Residental	3.9661	90.872
Rail Road	4.6	
Ag land	22.8	

	acres		Interior BLH acres			
West						
BLH Int1	0.49	*				
BLH Int2	0.84	*	* acres	rest of acres	total	
BLH Int3	5.85	*	88.97	366.03	455	
BLH Int4	10.7	*				
BLH Int5	30	*				
BLH Int6	10.9	*				
BLH Int7	16.6	*				
BLH Int8	42.3					
BLH Int9	4.42					
BLH Int10	31.3					
BLH Int11	5.31					
BLH Int12	4.78	*				
BLH Int13	8.81	*				
BLH Int14	10.8					
BLH Int15	19					
BLH Int16	24.6					
BLH Int17	9.1					
BLH Int18	8.1					
BLH Int19	11.9					
BLH Int20	11.7	Area minus * acres				
Total West	267.5	178.53				
East						
BLH Int21	40.2					
BLH Int 22	53					
BLH Int 23	94.3					
Total East	187.5					
Totals	455					

*areas, located primarily adjacent to proposed levee; with few if any hydrologic disruptions such as roads or subdivisions. All other areas have exensive roads and subdivisions which haver previously impacted the hydrology of the block.

Table 3. Future-with and Future-without Project Stand Structure Conditions.

FWOP

Habitat Condition	TY0				TY1	TY20				TY30				TY50			
Class	%O	%M	%H	Class	Class	%O	%M	%H	Class	%O	%M	%H	Class	%O	%M	%H	Class
>50 yrs. to marsh	64	46	22	4	4	50<75	>33	<33	4	50<75	>33	<33	4	33<50	<33	<33	2

Table 8. Future-with and Future-without Project Stand Maturity Conditions.

Future Without Project:

		AVERAGE DIAMETER (inches)					% Contribution by Number of Individuals				BASAL AREA (ft^2/ac)			
Habitat Condition Class	Level of Influence	Species Group	TY1	TY20	TY30	TY50	TY1	TY20	TY30	TY50	TY1	TY20	TY30	TY50
20-30 yrs. to marsh	FWOP	baldcypress	11.87	13.96	14.60	15.88	10.42	18.87	18.87	100.00	122.35	82.98	90.81	18.42
		tupelo et al.	13.56	15.08	15.81	0.00	89.58	81.13	81.13	0.00				
30-50 yrs. to marsh	FWOP	baldcypress	15.61	18.46	19.10	20.38	17.57	22.13	22.13	46.02	241.96	247.88	269.12	157.24
		tupelo et al.	14.80	16.70	17.50	19.10	82.43	77.87	77.87	53.98				
		baldcypress	16.66	19.51	20.15	21.43	41.51	48.62	48.62	58.67	280.03	320.24	345.15	338.32
>50 years to marsh	FWOP	tupelo et al.	14.57	16.47	16.47	18.87	58.49	51.38	51.38	41.33				

Table 8. Future-with and Future-without Project Stand Maturity Conditions.

Future Without Project:

Habitat Condition Class	Level of Influence	AVERAGE DIAMETER (inches)					% Contribution by Number of Individuals				BASAL AREA (ft^2/ac)			
		Species Group	TY1	TY20	TY30	TY50	TY1	TY20	TY30	TY50	TY1	TY20	TY30	TY50
>50 years to marsh	FWOP	baldcypress	16.66	19.51	20.15	21.43	41.51	48.62	48.62	58.67	280.03	320.24	345.15	338.32
		tupelo et al.	14.57	16.47	16.47	18.87	58.49	51.38	51.38	41.33				

TY0		TY0		Basel area			
BA	247.81	Cypress	138.77	cypress	116.24	155.7	167.81	198.49
		Tupelo	109.04	tupelo	163.79	164.54	177.34	139.83
		sum	247.81	sum	280.03	320.24	345.15	338.32

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

PLAN FORMULATION FOR COMPENSATORY MITIGATION FOR ENVIRONMENTAL IMPACTS TO WETLANDS
ANNEX S

Contents

Introduction 3
Management Measures 4
Initial Array of Mitigation Plans 4
Final Array of Mitigation Plans 11
Summary of IWR Plan CE/ICA Results 16

INTRODUCTION

This annex provides a summary of the plan formulation process used to develop compensatory mitigation sites for the West Shore Lake Pontchartrain (WSLP) environmental impacts to wetlands. In order to be consistent with the concepts and principles of Specific, Measurable, Attainable, Risk Informed, Timely (SMART) planning, proposed compensatory mitigation sites were based on existing available data sources and focuses on scaling the measures or features based on the mitigation needs laid out in Annex R of the Environmental Appendix.

Annex R identified the location and extent of the significant environmental resources impacted and underwent a habitat-based analysis based on two Wetland Value Assessment (WVA) models; Bottom Land Hardwood (BLH) and Swamp. Both results underwent Agency Technical Review (ATR) and model certification. The results of the analysis are presented in Table 1 and Table 2. Impacts throughout this document will be referred to in either 'acres' or 'Average Annual Habitat Units' (AAHUS). AAHUSs are a quantitative result of gains or losses of habitat over the period of analysis. In this case, between the planning years of 2020-2070.

Table 1. Impacted Resources.

Habitat	General location	Acres
Direct Swamp	East	253
	Central	540
	West	319
Direct Swamp	Berm	1.1
Total Direct Swamp		**1113**
Indirect Swamp	East	2325
	Central	4383
	West	1724
Total Indirect Swamp		**8432**
Indirect BLH with impacts		89
Direct BLH		123
Direct impacts are those impacts caused by the construction of the levee (conversion of swamp or BLH to levee). Indirect impacts are those caused by the enclosure of the Swamp or BLH on the protected side of the levee.		

Table 2. Summary of WVA Results Under the Intermediate Relative Sea Level Rise Scenario

WVA titles/groupings		Initial Acers	AAHUs
Direct Swamp	East	253	-142.2
	Central	540	-288.4
	West	319	-164.8
Total Direct Swamp			**-595.3**
Indirect Swamp	East	2325	-110.6
	Central	4383	-322.9
	West	1724	-60.9
Total Indirect Swamp			**-494.5**Berm
Berm Direct Swamp			1 -0.3
Total Swamp			**1,090.1**
Direct BLH		123	-95.5
Indirect BLH with impacts		89	-3.1

WVA titles/groupings	Initial Acers	AAHUs
Total BLH		**-98.6**
	TOTAL	**-1,188.7**

Direct impacts are those impacts caused by the construction of the levee (conversion of swamp or BLH to levee). Indirect impacts are those caused by the enclosure of the Swamp or BLH on the protected side of the levee. Note that a negative AAHUS represents a need for mitigation.

Consistent with a watershed approach the planning process used existing mitigation or ecosystem restoration measures and locations that had been previously studied. The locations were limited to those studied in the Pontchartrain Basin and within the Louisiana Coastal Zone to formulate plans to compensate for impacts the WLSP project could not avoid. Consideration of mitigation banks, consistent with Section 2036 of Water Resources Development Act (WRDA) 2007, was also included in the analysis. Identification and justification of the recommended mitigation plan was based on cost-effectiveness and incremental cost analysis. The following planning goal was developed to guide the development of the compensatory mitigation sites:

Selecting a mitigation plan that meets mitigation objectives and reasonably maximizes environmental benefits while passing tests of cost effectiveness and incremental cost analyses, acceptability, completeness, efficiency, and effectiveness is required by ER 1105-2-100 for Corps' feasibility studies.

MANAGEMENT MEASURES

Measures considered for mitigation planning are outlined below:

Swamp or BLH Reforestation: This measure would enhance and/or restore cypress forest and BLH forest in the basin through replanting areas. Areas for replanting would be in areas that would achieve a long-term success criterion.

Shoreline Protection: This measure would protect existing resources in the basin that are expected to be lost through erosion forces such as wave action along area lakes.

Hydraulic Restoration: This measure would improve the conditions of existing resources by returning the area to more natural conditions. This measure would include dike removals or freshwater diversions

Landscape Modification: This measure would develop new areas that would support Swamp or BLH habitats. Typically this would be achieved by raising or degrading existing landforms to a elevation that matches the local hydrology that would support Swamp or BLH habitats. This measure also includes planting of the new modified area.

Purchase of Credits: This measure would consider the use of a mitigation bank credits to compensate for wetland impacts that occur within the service area of an existing, approved mitigation bank.

INITIAL ARRAY OF MITIGATION PLANS

Consistent with the principles of SMART planning, the team began development of an initial array of alternative migration plans by reviewed existing studies and plans to determine if they would contain alternatives that would match the management measures layout. Below is a list of the source of data used:

- **CWPPRA PPL**- Existing Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Priority Project List (PPL) Information. The CWPPRA program yearly contains ecosystem projects that have had WVA and engineering analyses conducted. Projects not selected for authorization were used for mitigation planning.

- **2012 State of Louisiana Master Plan –** The 2012 Master Plan includes projects that were developed in coordination with resource agencies.
- **MRGO Eco.** – The Mississippi River Gulf Outlet (MRGO) Ecosystem Restoration Feasibility Study results underwent Agency Technical Review and model certification.
- **LCA ARDC** - The Louisiana Coastal Authority (LCA) LCA Amite River Diversion Canal (ARDC) Modification report contains alternatives that were not selected for authorization.
- **LPV -** The Lake Pontchartrain and Vicinity (LPV) Hurricane and Storm Damage Risk Reduction System (HSDRRS) planning documentation includes projects not select in the final plan that could be used in WSLP.

  Existing Mitigation Banks - The LPV project has collected an inventory of all available credits per the implementation guidance for the Water Resources Development Act of 2007, Section 2036(c) Wetlands Mitigation. The Project Delivery Team (PDT) updated LPV list based on RIBITS (Regulatory In lieu fee and Bank Information Tracking System) http://geo.usace.army.mil/ribits/index.html. We also only looked at those that had the appropriate habitat type, were in the coastal zone and were on the flood side of a protection levee. There are no available credits for BLH.

Using the sources above the team was able to develop a range of plans (Table 3) based on the management measures listed. Before developing a range of cost and benefits for each plan, each plan underwent an initial screening to determine if it was a viable alternate to be carried forward. Plans highlighted in yellow were carried forward.

Table 3: Initial Array of Mitigation Plans

Plan ID	Measure	Habitat	Name	Source	Short Description	Initial Status before CE/ICA development
Mitigation_Bank_Credits_72	*Purchase of Credits*	Swamp	Swamp Mitigation Bank Credit Purchase	LPV	CEMVN, in conjunction with the U.S. Fish and Wildlife Service, has run WVA's on the approved banks in the LPV Basin.	**Carried Forward**, Based on PET calculations there would still be up to 72 AAHUs available after LPV makes a purchase.
State_MP_001.DI.05	*Hydraulic Restoration*	Swamp, BLH, Marsh	Bonnet Carre Diversion (5,000 cfs)	2012 State of Louisiana Master Plan	Diversion at Bonnet Carre, 5,000 cfs capacity	**Screened Out.** Project would required a change in the Authorized use of the spillway. Also meeting the mitigation potential would be highly depended on the stages in the River. Stages would have to flood the forebay for the project to work
State_MP_001.DI.29	*Hydraulic Restoration*	Swamp	West Maurepas Diversion (2,000 cfs)	2012 State of Louisiana Master Plan	Diversion to Maurepas Swamp in the vicinity of Convent/Blind River, 2,000 cfs capacity	**Screened Out.** Project is Currently under LCA
State_MP_001.DI.21 001.DI.28	*Hydraulic Restoration*	Swamp	East Maurepas Diversion (5,000 cfs or 2,000 cfs)	2012 State of Louisiana Master Plan	Diversion to Maurepas Swamp in the vicinity of Hope Canal, 2,000 to 5,000 cfs capacity1	**Carried forward.** The total impact acres presented in CWPPRA will be used as the area of influence and project will assume to maintain what will be lost in the Future Without Project Condition (FWOP) action.
State_MP_001.DI.22	*Hydraulic Restoration*	Swamp	East Maurepas Diversion (25,000 cfs)	2012 State of Louisiana Master Plan	Diversion to Maurepas Swamp in the vicinity of Hope Canal, 25,000 cfs capacity (operation at capacity when Mississippi River flows exceed 400,000 cfs, operation at 4% of river flows below 400,000 cfs)	**Screened Out.** AAHUs and cost would be outside the range need for WSLP

State_MP_001.SP.02	*Shoreline Protection*	Swamp	Maurepas Shoreline Protection	2012 State of Louisiana Master Plan	Shoreline Protection along Maurepas landbridge (east and west sides)	**Carried forward.** Will assume 35 ac is forested wetlands
State_MP_001.MC.08a	*Landscape Modification*	Marsh	Central Wetlands - Component A	2012 State of Louisiana Master Plan	Creation of approximately 2,010 acres of marsh in Central Wetlands near Bayou Bienvenue (through sediment dredging of the Mississippi River and placement at an elevation of 3.2 feet NAVD88) to create new wetland habitat, restore degraded marsh, and reduce wave erosion (component of 001.MC.08).	**Screened Out**, Was initially carried forward, but a review of Mississippi River Gulf Outlet (MRGO) projects used a cost and AAHUSs for a forested wetland site. PDT decided to use MRGO site; we did not use because site was developed as marsh, not swamp.
MRGO_Feature CC2	*Landscape Modification/ Swamp Reforestation*	Swamp	MRGO-Feature CC2	MRGO Eco.	250 acres of swamp nourishment and 250 acres of swamp restoration.	**Carried forward**.
LCA_AMITE_Alt 35	*Hydraulic Restoration/ Swamp Reforestation*	Swamp	LCA Alt 35 Canal Bank Gappings and Plantings	LCA ARDC	See LCA ARDC Report	**Screened Out**, components of this alternative are being constructed under the LCA project authorization.
LCA_AMITE_Alt 38	*Hydraulic Restoration/ Swamp Reforestation*	Swamp	LCA Alt 38 Canal Bank Gappings and Plantings	LCA ARDC	See LCA ARDC Report	**Screened Out**, components of this alternative are being constructed under the LCA project authorization.
LCA_AMITE_Alt 37	*Hydraulic Restoration/ Swamp Reforestation*	Swamp	LCA Alt 37 Canal Bank Gappings and Plantings	LCA ARDC	Includes two breaches in the Amite River Diversion canal bank, three gaps in the railroad embankment and planting in area of influence see LCA ARDC Report for details.	**Carried forward.**
LCA_AMITE_Alt 39	*Hydraulic Restoration/ Swamp Reforestation*	Swamp	LCA Alt 39 Canal Bank Gappings and Plantings	LCA ARDC	See LCA ARDC Report	**Screened Out**, components of this alternative are being constructed under the LCA project authorization.

LCA_AMITE_Alt 37_Plantings_Only	*Hydraulic Restoration/ Swamp Reforestation*	Swamp	LCA Alt 37 Plantings	LCA ARDC	Project only includes plantings from LCA ARDC	**Carried forward.**
CWPPRA_CW-01	*Hydraulic Restoration/ Swamp Reforestation*	Swamp	CWPPRA Coastwide Canal Backfilling Pilot	CWPPRA	Typically, backfill areas are too far removed from sediment borrow sources to be deemed viable. As an alternative, this project proposes to backfill the canals by removing the existing spoil banks and disposing of the dredged material in the canals. While there is not sufficient sediment volume remaining in most spoil banks to completely fill the canals to adjacent wetland elevation, typically there is enough to significantly shallow the canals, and over time some additional filling is observed. Those areas returned to adjacent wetland elevation could vegetate without the need for planting. In addition, removal of the spoil banks could restore natural hydrology across the wetland surface over a larger area in the vicinity of the canals.	**Screened Out.** This alternative was proposed by resources agencies, but without detailed modeling we would not be able to determine the mitigation potential to the restore natural hydrology across the wetland surface over a larger area in the vicinity of the canals. There is also a risk that in some cases if the canal bank was preventing saltwater from reaching the interior areas of the forested wetlands, we could be negativity influencing the area. Also in most cases, the canal banks include BLH species and also provide areas of refuge for species such as deer and rabbits during high water events. Degrading these areas would be removing BLH habitat and would have to be included in the final AAHU potential as a negative impact.
LPV_Milton Island Swamp Restoration	*Landscape Modification/ Swamp Reforestation*	Swamp	Milton Island Swamp Restoration	LPV	Dredging from Western Lake Pont. Filling openwater areas. plant with swamp species.	**Carried forward.**

LPV_Bonnet Carre Bottomland Hardwood Restoration	*Landscape Modification/ BLH Reforestation*	BLH	Bonnet Carre Bottomland Hardwood Restoration	LPV	Waste borrow from the construction of the Floodside ditch and Protection side canal from the construction of the levee would be used to create BLH areas in the BC spillway.	**Carried forward, but will be evaluated outside of the CE/ICA because the habitat type is BLH. There only a limited existing project creating BLH. There currently are no BLH credits available in the Basin and within the Coastal Zone.**
LPV_Bonnet Carre Swamp Restoration	*Landscape Modification/ Swamp Reforestation*	Swamp	Bonnet Carre Swamp Restoration	LPV	Waste borrow from the construction of the Floodside ditch and Protection side canal from the construction of the levee would be used to create SWAMP areas in the BC spillway.	**Carried forward.**
LPV_ Frenier Area	*Landscape Modification/ BLH Reforestation*	BLH	Frenier Area Bottomland Hardwood (BLH) Restoration	LPV	Lower elevation of existing farmland to create BLH habitat.	**Carried forward, but will be evaluated outside of the CE/ICA because the habitat type is BLH. There is only a limited existing project that creates BLH. There currently are no BLH credits available in the Basin and within the Coastal Zone.**
LPV_Expanded_Maurepas Crawfish Ponds Restoration_St. James Pond 1thru4	*Hydraulic Restoration/ Swamp Reforestation*	Swamp	St. James Parish Existing Crawfish Pond near Air Products(Assumed Inactive Pond)	LPV	Degrade existing water control dikes, clear site, plant with swamp species.	**Carried forward. Cost and benefits will be on LPV sites in the area and AAHU potential/acre.**
LPV_Expanded_Maurepas Crawfish Ponds Restoration_St. James Pond 5	*Hydraulic Restoration/ Swamp Reforestation*	Swamp	St. James Parish Existing Crawfish Pond near Hwy 3125 and Hwy 3214 Intersection (Assumed Inactive Pond)	LPV	Degrade existing water control dikes, clear site, plant with swamp species.	**Carried forward. Cost and benefits will be on LPV sites in the area and AAHU potential/acre.**

LPV_Expanded_Maurepas Crawfish Ponds Restoration_St. James Pond 6	*Hydraulic Restoration/ Swamp Reforestation*	Swamp	St. James Parish Existing Crawfish Pond near Hwy 3125 and Lilly Rd. Intersection (Assumed Active Pond)	LPV	Degrade existing water control dikes, clear site, plant with swamp species	**Screened Out.** Based on observations from roadway and from subsequent site visits the pond was actively being used and frequently for crawfish production.
LPV_Expanded_Maurepas Crawfish Ponds Restoration_Ascension Pond 1thru4	*Hydraulic Restoration/ Swamp Reforestation*	Swamp	Ascension Parish near Sorrento along Airline Hwy (Assumed Inactive Pond)	LPV	Degrade existing water control dikes, clear site, plant with swamp species	**Carried forward. Cost and benefits will be on LPV sites in the area and AAHU potential/acre.**
LPV_Expanded_Lutcher Polder Farmlands Swamp Restoration_Site1	*Landscape Modification/ Swamp Reforestation*	Swamp	Existing Farm Land Near Berms 1, 2 and 3	LPV	Clear site, degrade farm land to create swamp sites. Sites chosen based on giving added protection to the n berms.	**Carried forward. Cost and benefits will be on LPV sites in the area and AAHU potential/acre.**

FINAL ARRAY OF MITIGATION PLANS

For the final array of plans, cost and benefits were developed based on existing data from the sources list above. Table 4 provides a summary the final cost and benefits used for the IWR CE/ICA evaluation. The estimated construction cost includes development cost and monitoring before turning the project over to the sponsor. Estimated RE cost and OMRR&R cost were also developed for each plan. Construction and RE cost were annualized over a 5 yr construction period, and estimated OMRR&R cost were annualized over a 50 year period to develop a total average annual cost for each plan. The table also includes notes and codes used for the final evaluation. The remaining plans were given specific codes for the IWR Planning Suite Decision Support Software Site:

Swamp Mitigation Measures

Code	Project ID
A	Mitigation_Bank_Credits_72
	State_MP_001.DI.21
B	001.DI.28
C	State_MP_001.SP.02
D	MRGO_Feature CC2
E	LCA_AMITE_Alt 37
F	LCA_AMITE_Alt 37_Plantings_Only
G	LPV_Milton Island Swamp Restoration
H	LPV_Bonnet Carre Bottomland Hardwood Restoration
I	LPV_Bonnet Carre Swamp Restoration
J	LPV_ Frenier Area
K	LPV_Expanded_Maurepas Crawfish Ponds Restoration_St. James Pond 1thru4
L	LPV_Expanded_Maurepas Crawfish Ponds Restoration_St. James Pond 5
M	LPV_Expanded_Maurepas Crawfish Ponds Restoration_Ascension Pond 1thru4
N	LPV_Expanded_Lutcher Polder Farmlands Swamp Restoration_Site1

At this point additional investigations were conducted on each site. In a subsequent reviews, some sites were removed based on resource agency input and initial CE/ICA evaluations outside of the planning software. For example, there were only two proposed BLH sites:

BLH Mitigation Measures

Code	Project ID
H	LPV_Bonnet Carre Bottomland Hardwood Restoration
J	LPV_ Frenier Area

Due to the fact that these were the only two viable alternatives for BLH this measures were not included in the actual CE/ICA evaluations using the planning software. The most cost effective project, the "LPV_Bonnet Carre Bottomland Hardwood Restoration" was included in the final selection.

Table 4: Inputs into IWR Plan CE/ICA for Swamp Measures Only

Plan ID	Name	Source	Est. Total Construction Cost[1]	Est. RE Cost	Est. Total OMRR&R (50yrs)[2]	Interest During Construction (IDC)	Annual Cost	Estimated AAHUs	CE/ ICA CODE	Comments for IWR runs
Mitigation_Bank_Credits _72	Swamp Mitigation Bank Credit Purchase	LPV	$6,000,000	-	-	$0	$256,000	72	**A**	Updated Cost using recent LPV cost
State_MP_001.DI.21 001.DI.28	East Maurepas Diversion (5,000 cfs or 2,000 cfs)	2012 State of Louisiana Master Plan	$195,000,000	- (State owned lands)	$35,000,000	$14,100,000	$9,600,000	8,500	**B**	AAHUs based on CWPPRA estimates. Assumes the project could not be scoped down to receive a lower AAHU value at a lower cost. This project is identified in the main report as the "River Reintroduction into Maurepas Swamp (PO-29)" that would divert Mississippi River water into the Maurepas Swamp through Hope Canal.
State_MP_001.SP.02	Maurepas Shoreline Protection	2012 State of Louisiana Master Plan	$57,000,000	- (State owned lands)	$42,880,000	$1,000,000	$3,600,000	26.12	**C**	AAHUs based on a loss of 35 ac of forested wetlands under the FWOP conditions

MRGO_Feature CC2	MRGO-Feature CC2	MRGO Eco.	$21,200,000	$500,000	$3,500,000	$380,000	$1,000,000	134.00	**D (Removed)**	**Removed from final evaluation.** Was initially run through CE/ICA, but a review of MRGO project features revealed that the benefits are based on Tier 2 conditions to obtain benefits. The AAHU potential would only be achieved if there was a diversion in the area. This project was used to show the potential for lower cost mitigation sites if a diversion already existed. It could not be used for the final selection. O&M is based on the Amite Plantings Site cost for monitoring.
LCA_AMITE_Alt 37	LCA Alt 37 Canal Bank Gappings and Plantings	LCA ARDC	$8,500,000	- (State owned lands)	$7,330,000	$150,000	$500,000	922.00	**E (Removed)**	**Removed from final evaluation.** While undergoing agency review it was determined that the State is building the canal gapping component of the project with CIAP funds. (Updated Cost using LPV cost)
LCA_AMITE_Alt 37_Plantings_Only	LCA Alt 37 Plantings	LCA ARDC	$7,700,000	- (State owned lands)	$3,500,000	$400,000	$400,000	339.00	**F**	Updated Cost using recent LPV cost. AAHUs based on LCA ARDC WVA evaluation.

LPV_Milton Island Swamp Restoration	Milton Island Swamp Restoration	LPV	$22,500,000	$500,000	$2,700,000	$400,000	$1,040,000	131.00	**G (Removed)**	**Removed from final evaluation.** While undergoing agency review it was determined that, the project would have to undergo formal consultation for potential Gulf Sturgeon impacts. It could not be used for the final selection due to the fact that it would place the WSLP report on hold until formal consultation was completed.
LPV_Bonnet Carre Bottomland Hardwood Restoration	Bonnet Carre Bottomland Hardwood Restoration	LPV	$2,000,000	- (Federal Owned Lands)	$500,000	$34,000	$94,000	99.00	**H (Removed)**	**Removed from final evaluation but was selected to address BLH impacts.**
LPV_Bonnet Carre Swamp Restoration	Bonnet Carre Swamp Restoration	LPV	$4,000,000	- (Federal Owned Lands)	$1,400,000	$69,000	$197,000	121.00	**I**	Updated Cost using recent LPV cost. AAHUs based LPV evaluations.
LPV_ Frenier Area	Frenier Area Bottomland Hardwood (BLH) Restoration	LPV	$4,900,000	$2,000,000	$393,000	$120,000	$305,000	70.44	**J (Removed)**	**Removed from final evaluation.** The site would be on the inside of the WSLP levee and the Bonnet Carre BLH site was also more cost effective.
LPV_Expanded_Maurepas Crawfish Ponds Restoration_St. James Pond 1thru4	St. James Parish Existing Crawfish Pond near Air Products(Assumed Inactive Pond)	LPV	$4,000,000	$3,000,000	$1,510,000	$122,000	$328,000	77.54	**K**	Updated Cost using recent LPV cost. AAHUs based on LPV mitigation potential from restored crawfish ponds.
LPV_Expanded_Maurepas Crawfish Ponds Restoration_St. James Pond 5	St. James Parish Existing Crawfish Pond near Hwy 3125 and Hwy 3214 Intersection (Assumed Inactive Pond)	LPV	$1,150,000	$1,000,000	$690,000	$38,000	$105,000	27.34	**L**	Updated Cost using recent LPV cost. AAHUs based on LPV mitigation potential from restored crawfish ponds.

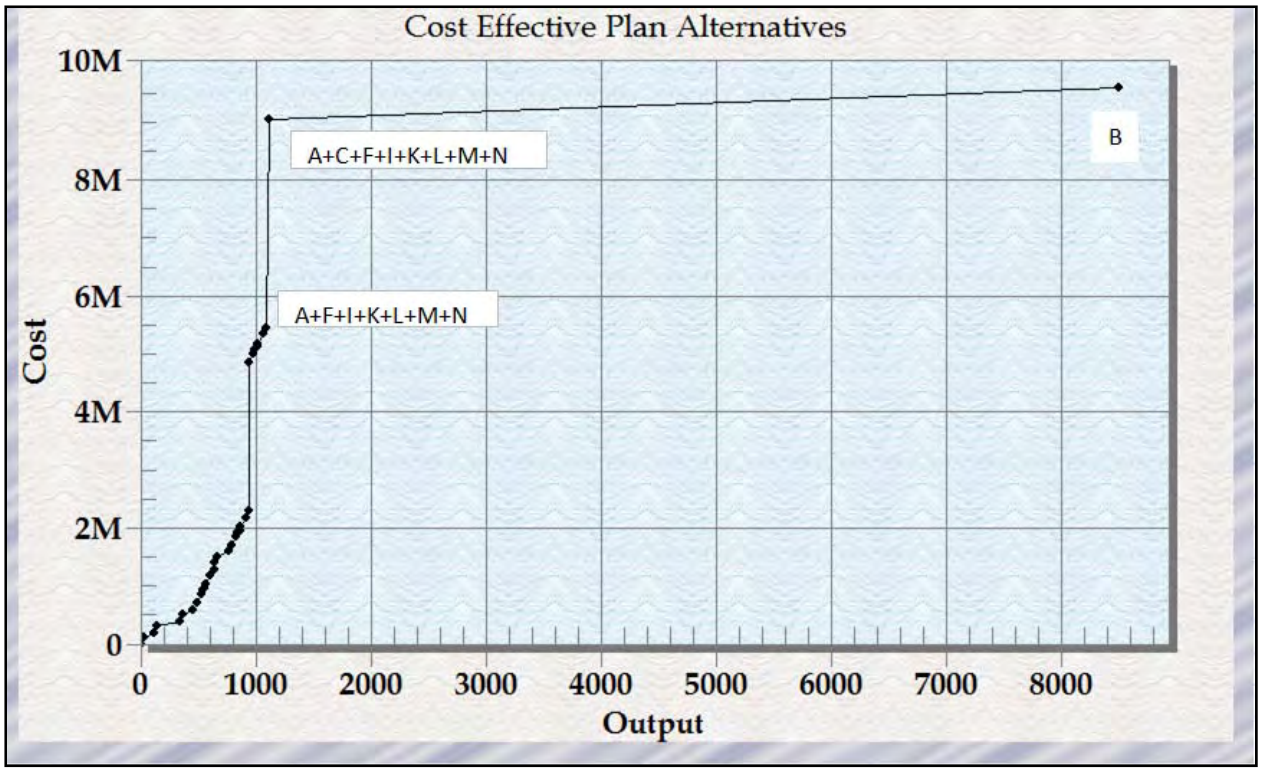
LPV_Expanded_Maurepas Crawfish Ponds Restoration_Ascension Pond 1thru4	Ascension Parish near Sorrento along Airline Hwy (Assumed Inactive Pond)	LPV	$11,100,000	$10,000,000	$5,124,000	$369,000	$1,004,000	302.25	**M**	Updated Cost using recent LPV cost. AAHUs based on LPV mitigation potential from restored crawfish ponds.
LPV_Expanded_Lutcher Polder Farmlands Swamp Restoration_Site1	Existing Farm Land Near Berms 1, 2 and 3	LPV	$66,000,000	$6,000,000	$2,144,000	$1,259,000	$3,157,000	151.00	**N**	Updated Cost using recent LPV cost. AAHUs based on LPV mitigation potential from farm sites.

[1]Est. Total Construction Cost includes development cost and monitoring to insure initial success be turning over to sponsor.
[2]Est. Total OMRR&R includes monitoring, reporting, and other maintenance activities such as invasive species control.

SUMMARY OF IWR PLAN CE/ICA RESULTS

The results of initial IWR Plan CE/ICA results (Figure 1) showed that the one project alone; the "East Maurepas Diversion (5,000 cfs or 2,000 cfs)" (**CODE B**) would be the best buy plan, but the project would provide more benefits than required for compensatory mitigation. The Swamp impacts required are only 1,089 AAHUS. The estimated total AAHUS provided by the diversion (~8,500 based on CWPPRA numbers) would be well over the required amount. The goal of compensatory mitigation is no net loss of wetlands. The current WSLP authorization could not provide complete funding for wetland restoration above and beyond what is needed for mitigation. A river reintroduction project such as the East Maurepas Diversion (5,000 cfs or 2,000 cfs) project could result in more wetland benefits than are needed for mitigation purposes. The total projected benefits of such a project would need to be apportioned between what is needed for mitigation purposes and what would be paid for with some other funding source. Currently the East Maurepas Diversion (5,000 cfs or 2,000 cfs) as proposed under the State's Master Plan has yet to identify any funding for the project. (See discussions on Chapter 2 of the main report related to the "River Reintroduction into Maurepas Swamp (PO-29)" project. In order for this plan to be selected additional funding would be needed to cover those project costs that are above and beyond what is needed for mitigation purposes. In addition, concerns related to the success of key ecological outputs or benefits would have to be agreed upon between all parties. Marsh creation or reforestation mitigation project can be relatively simple and quick, and the ecological outputs of the required habitat type needed to comply with Federal laws, regulations, and policies can easily be achieved over the life of the authorization. A diversions outputs over time can be influenced by the amount and timing of diverted flows, sediment concentrations in the river and also by relative sea level rise. Due the fund uncertain and risk with maintain benefits over the project authorization the team did not select the "Best Buy" plan in the initial IWR Plan CE/ICA results.

Figure 1: Initial IWR Plan CE/ICA results
("East Maurepas Diversion (5,000 cfs or 2,000 cfs)" (**CODE B**) included)



The team at that point re-ran IWR Plan CE/ICA without the "East Maurepas Diversion (5,000 cfs or 2,000 cfs)" (**CODE B**) plan included. The team then reviewed results and determined that the next most cost effective plan to meet WSLP compensatory mitigation needs for swamp would be the following combination: **A+F+I+K+L+M+N**. (Figure 2 and Figure 3) This plan would also be considered a "Best Buy" plan.

Code	Project ID
A	Mitigation_Bank_Credits_72
F	LCA_AMITE_Alt 37_Plantings_Only
I	LPV_Bonnet Carre Swamp Restoration
K	LPV_Expanded_Maurepas Crawfish Ponds Restoration_St. James Pond 1thru4
L	LPV_Expanded_Maurepas Crawfish Ponds Restoration_St. James Pond 5
M	LPV_Expanded_Maurepas Crawfish Ponds Restoration_Ascension Pond 1thru4
N	LPV_Expanded_Lutcher Polder Farmlands Swamp Restoration_Site1

The combination would provide for a total of 1,090.14 AAHUs for swamp habitat. This combination with the 99.0 AAHUs by the "LPV_Bonnet Carre Bottomland Hardwood Restoration" would provide for a total of 1,189.14 AAHUs. This combination would place this grouping less than 1 AAHU over the required 1,188.7 AAHUs impacted by the project. Table 5 shows the all of the outputs of the final CE/ICA analysis. The combination (A+**C**+F+I+K+L+M+N) including the "Maurepas Shoreline Protection" plan was not selected because it would include more than the required compensatory mitigation needed.

Figure 2 Final IWR Plan CE results
("East Maurepas Diversion (5,000 cfs or 2,000 cfs)" (**CODE B**) Removed)

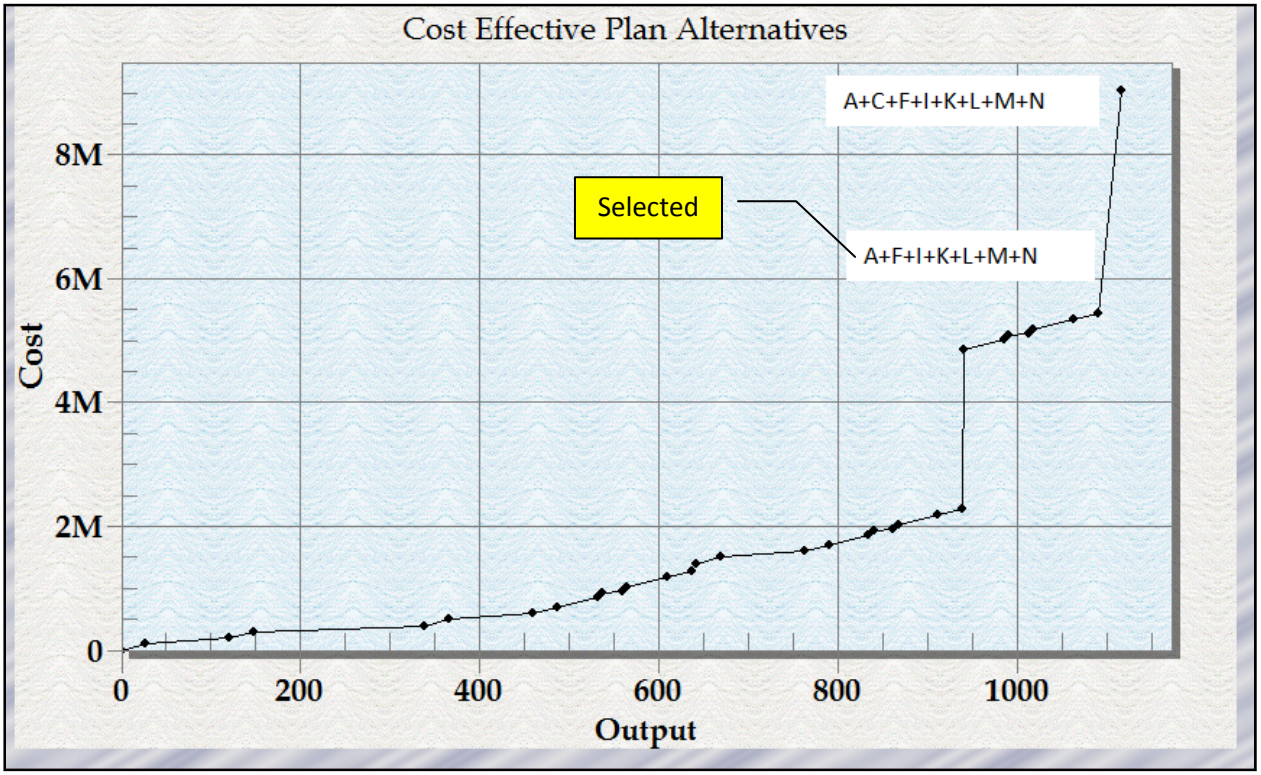


Figure 3 Final IWR Plan CE/ICA results

("East Maurepas Diversion (5,000 cfs or 2,000 cfs)" (**CODE B**) Removed)

Best Buy Plans-Incremental Cost Analysis

Name	AA Cost	AAHU	Incremental AA Cost	Incremental AAHU	Average Incremental Cost per Incremental AAHU
A+C+F+I+K+L+M+N	9,043,588.35	1,116.26	3,603,838.78	26.12	137,990.47
A+F+I+K+L+M+N	5,439,749.58	1,090.14	3,156,423.00	151.00	20,903.46
A+F+I+K+L+M	2,283,326.58	939.14	327,185.00	77.54	4,219.36
A+F+I+L+M	1,956,141.58	861.60	105,078.00	27.34	3,842.86
A+F+I+M	1,851,063.58	834.25	255,802.26	72.00	3,552.81
F+I+M	1,595,261.32	762.25	1,003,441.00	302.25	3,319.87
F+I	591,820.32	460.00	196,573.25	121.00	1,624.57
F	395,247.06	339.00	395,247.06	339.00	1,165.92

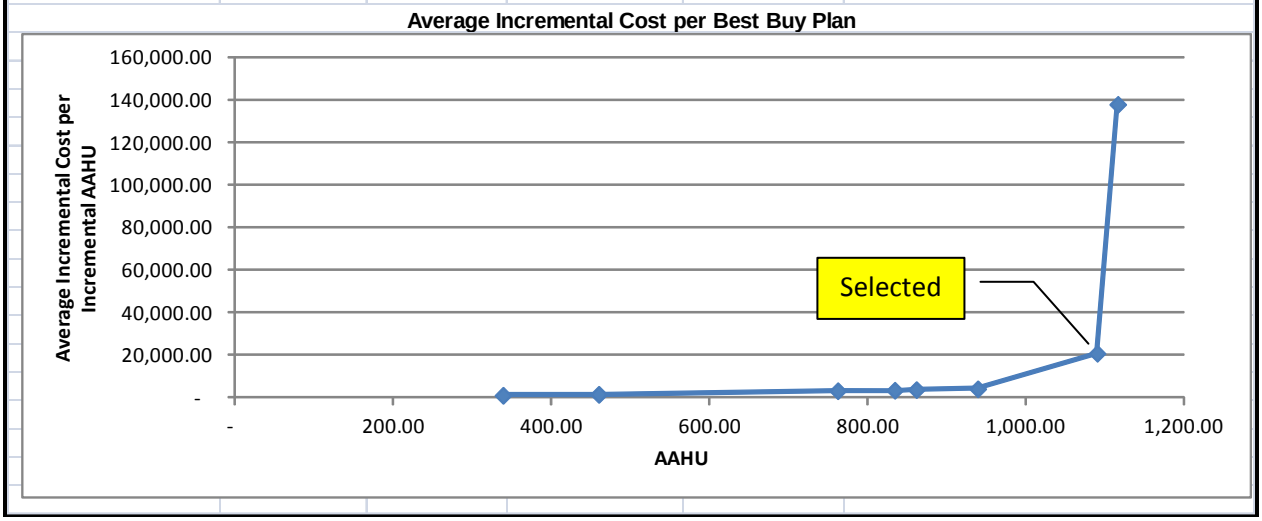


Table 5. WSLP CE/ICA Results

Name	AA Cost	AAHU	Cost Effective/Best Buy
A+C+F+I+K+L+M+N	9,043,588.35	1,116.26	Best Buy
A+F+I+K+L+M+N	5,439,749.58	1,090.14	Best Buy (Selected)
A+F+I+K+M+N	5,334,671.58	1,062.80	Yes
F+I+K+L+M+N	5,183,947.32	1,018.14	Yes
A+F+I+L+M+N	5,112,564.58	1,012.60	Yes
F+I+K+M+N	5,078,869.32	990.80	Yes
A+F+I+M+N	5,007,486.58	985.25	Yes
F+I+L+M+N	4,856,762.32	940.60	Yes
A+F+I+K+L+M	2,283,326.58	939.14	Best Buy
A+F+I+K+M	2,178,248.58	911.80	Yes
F+I+K+L+M	2,027,524.32	867.14	Yes
A+F+I+L+M	1,956,141.58	861.60	Best Buy
F+I+K+M	1,922,446.32	839.80	Yes
A+F+I+M	1,851,063.58	834.25	Best Buy
F+I+L+M	1,700,339.32	789.60	Yes
F+I+M	1,595,261.32	762.25	Best Buy
F+L+M	1,503,766.06	668.60	Yes

Name	AA Cost	AAHU	Cost Effective/Best Buy
F+M	1,398,688.06	641.25	Yes
A+F+I+K+L	1,279,885.58	636.89	Yes
A+F+I+K	1,174,807.58	609.54	Yes
F+I+K+L	1,024,083.32	564.89	Yes
A+F+I+L	952,700.58	559.34	Yes
F+I+K	919,005.32	537.54	Yes
A+F+I	847,622.58	532.00	Yes
F+I+L	696,898.32	487.34	Yes
F+I	591,820.32	460.00	Best Buy
F+L	500,325.06	366.34	Yes
F	395,247.06	339.00	Best Buy
I+L	301,651.25	148.34	Yes
I	196,573.25	121.00	Yes
L	105,078.00	27.34	Yes

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
INTEGRATED DRAFT FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex T

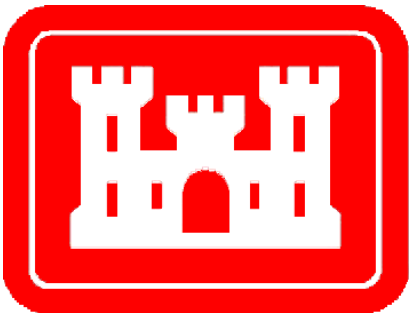
Hazardous, Toxic and Radioactive Waste

HTRW 14-02

WEST SHORE LAKE PONTCHARTRAIN FEASIBILITY STUDY ST. JOHN THE BAPTIST PARISH AND ST. JAMES PARISH, LOUISIANA PHASE I ENVIRONMENTAL SITE ASSESSMENT

28 FEBRUARY 2014

Prepared by
U.S. Army Corps of Engineers
New Orleans District



U.S. Army Corps of Engineers
New Orleans District
7400 Leake Ave.
New Orleans, LA 70118-3651

Prepared by:

_____

Joseph Musso
Environmental Planning and
Compliance Branch
New Orleans District

Date: _____

Table of Contents

	Executive Summary	1
I.	**Introduction**	1
	1.1 Purpose	2
II.	**Project/Site Description**	2
	2.1 Location Description	2
	2.2 Site/Vicinity Characteristics	3
III.	**User Provided Information**	3
IV.	**Records Review**	3
	4.1 Environmental Sources	3
	4.1.1 Federal Records	3
	4.1.2 State and Local Records	4
	4.1.3 Results	5
	4.2 Historical Use Information	7
	4.2.1 Aerial Photograph Review	7
	4.2.2 Topographic Map Review	8
	4.2.3 Sanborn Maps Review	8
	4.2.4 City Directory Review	8
V.	**Site Reconnaissance**	8
VI.	**Interviews**	8
VII.	**Findings**	8
VIII.	**Opinion**	9
IX.	**Conclusions**	9
X.	**Limitations**	9
XI.	**References**	10
XII.	**Qualifications**	10
XIII.	**Appendices**	11

Executive Summary

The West Shore Lake Pontchartrain (WSLP) Project is a hurricane and storm damage risk reduction project. The project, which consists of constructing approximately 19 miles of earthen levee, concrete floodwalls, floodgates, drainage canals, flood side ditch for hydraulic connectivity for wetlands north and south of the recommended plan, drainage structures, and pump stations located along the alignment, is designed to provide storm surge risk reduction to the communities of Montz, Laplace, Reserve, and Garyville in St. John the Baptist Parish. The localized storm surge risk reduction measures of the project are located along LA Highway 3125 near the communities of Lutcher and Convent in St. James Parish. The mitigation portion of the project consists of reestablishing freshwater swamp by implementing vegetative planting of cypress seedlings near Blind River, creating swamp-like conditions and planting bottomland hardwoods in the Bonnet Carre spillway, using dredged material from Lake Pontchartrain to create swamp and planting swamp tree species, and degrading and creating swamp-like conditions and planting swamp tree species in the Lutcher Polder and the Maurepas Crawfish Ponds.

Personnel from USACE-MVN-PDC-CEC made a field inspection on 13 February 2014 of the West Shore Lake Pontchartrain (WSLP) Alternative C project area. A field inspection of the WSLP Localized storm surge risk reduction measures areas and the Lutcher Polder area was conducted on 25 February 2014. The areas were inspected for the presence of pipes, containers, tanks or drums, ponds or lagoons, car bodies, tires, refrigerators, trash dumps, electrical equipment, oil drilling equipment, gas or oil wells, discoloration of vegetation or water sheens, discoloration of soils, out-of-place dirt mounds or depressions in the landscape, evidence of fire, stressed soils with lack of vegetation, discoloration of vegetation, animal remains, unusual animal behavior, biota indicative of a disturbed environment, and odors indicative of poor water quality or chemical presence. Government and commercial environmental databases, historical aerial photographs, and historic topographical maps were also reviewed for the presence of Recognized Environmental Conditions (RECs) that would affect the proposed project sites.

Numerous oil and gas pipelines, oil and gas well-heads (active, inactive, and plugged and abandoned), and oil and gas related facilities were found to be located within or near the footprint of the structural and localized storm surge risk reduction measures project areas and the Lutcher Polder.

Due to limited access to the Blind River, Bonnet Carre Spillway, Milton Island, and the Maurepas Crawfish Ponds locations, no field inspections were conducted at those locations. A data base search, however, was conducted for the mitigation areas. Several potential RECs (pipelines and oil and gas wells) were identified within five of the seven mitigation areas.

Care must be taken to avoid impacting any pipelines or oil and gas wells during construction of the structural, localized storm surge risk reduction measures, and mitigation features.

The objective of the Phase I Environmental Site Assessment (ESA) is to identify, to the extent feasible pursuant to the process described herein, RECs in connection with a given property. This assessment revealed several potential RECs (pipelines and oil and gas wells) in

connection with the project's structural and localized storm surge risk reduction measures sites as well as within five of the seven mitigation areas.

I. Introduction

1.1 Purpose

The USACE regulations (ER-1165-2-132) and District policy requires procedures be established to facilitate early identification and appropriate consideration of potential hazardous, toxic, or radioactive waste (HTRW) in reconnaissance, feasibility, preconstruction engineering and design, land acquisition, construction, operations and maintenance, repairs, replacement, and rehabilitation phases of water resources studies or projects, by conducting a Phase I Environmental Site Assessment (ESA). These assessments follow the process/standard practices for conducting Phase I ESAs published by the American Society for Testing and Materials (ASTM).

This assessment was prepared using the following ASTM Standard:

E 1527-05: Standard Practice for Environmental Site Assessments – Phase I Environmental Site Assessment Process. American Society for Testing and Materials, International; West Conshohocken, Pennsylvania; 2005

The purpose of a Phase I ESA is to identify, to the extent feasible in the absence of sampling and analysis, the range of contaminants (i.e. RECs) within the scope of the US Environmental Protection Agency's (USEPA) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and petroleum products.

The scope of this Phase I ESA consists of the following four components:

a. Records review

b. Site reconnaissance

c. Interviews

d. Report

II. Project/Site Description

2.1 Location Description

The project is located near the towns of Laplace, Reserve, and Garyville, in St. John the Baptist Parish with the localized storm surge risk reduction measures located near Lutcher and Convent, in St. James Parish, Louisiana. The mitigation areas are located near Maurepas in Livingston Parish, near Norco in St. Charles Parish, near Madisonville in St. Tammany Parish, near Sorrento in Ascension Parish, and near Lutcher and Convent in St. James Parish. See figures for more precise locations.

2.2 Site/Vicinity Characteristics

The structural and localized storm surge risk reduction measures project vicinity is a lightly developed rural area of southeast Louisiana that is located between New Orleans and Baton Rouge. A mixture of residential, light commercial, and light, medium, and heavy industrial properties are located to the south, southeast, and southwest of the project area. The project locations are near the towns of Laplace, Reserve, and Garyville, in St. John the Baptist Parish, and near Lutcher and Convent, in St. James Parish, Louisiana.

The mitigation sites consist of undeveloped swamp land near the Blind River near Maurepas in Livingston Parish, undeveloped land within the Bonnet Carre Spillway near Norco in St. Charles Parish, existing swamp land (Milton Island) in St. Tammany Parish, agricultural land (Crawfish Pond #1) in Ascension Parish, and agricultural land (Lutcher Polder and Crawfish Ponds #2 and #3) in St. James Parish.

III. User Provided Information

Aerial photographs and topographic maps depicting the site were provided by USACE New Orleans District personnel.

IV. Records Review

For the purpose of this ESA, the following standard records sources were obtained and reviewed to assist in the identification of RECs in connection with this proposed project.

• Environmental Sources (Federal, State and Local, Tribal, and Proprietary)

• Historical Use (topographic maps and aerial photographs)

4.1 Environmental Sources

Publicly available environmental records were obtained and reviewed from available resources on the internet or in correspondence with the managing institution. Not all databases are publicly available with the most recent data that can be referenced as meeting the ASTM 1527-05 standard, and unavailable information must be considered a data gap.

4.1.1 Federal Records

The following information sources (databases) were consulted and searched as a part of the federal agency review process:

a. United States Environmental Protection Agency's (USEPA) National Priorities List (NPL database – current and deleted sites);

b. USEPA Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS);
c. USEPA No Further Remedial Action Planned Sites (NFRAP);

d. USEPA Resource Conservation and Recovery Information System (RCRIS)

e. USEPA Emergency Response Notification System (ERNS);

f. USEPA Corrective Action Report (CORRACTS);

g. USEPA Biennial Reporting System (BRS);

h. USEPA Superfund (CERCLA) Consent Decrees (CONSENT);

i. USEPA Facility Index System/Facility Identification Initiative Program Summary Report (FINDS);

j. USDOT Hazardous Materials Information Reporting System (HMIRS);

k. USNRC Material Licensing Tracking System (MLTS);

l. USEPA Federal Superfund Liens (NPL LIENS);

m. USEPA PCB Activity Database System (PADS);

n. USEPA RECRA Administrative Action Tracking System (RAATS);

o. USNTIS Records of Decision (ROD);

p. USEPA Toxic Chemical Release Inventory System (TRIS);

q. USEPA Toxic Substances Control Act (TSCA).

A search of available environmental records was conducted. These records assist in meeting the requirements of USEPA's Standards and Practices for All Appropriate Inquires (40 CFR Part 312), and the ASTM Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. For properties that contained inadequate address information for mapping purposes, reasonable efforts were made to identify the approximate location of the sites in relation to the target properties, as part of the review process. In addition, the physical setting was assessed for the target properties by reviewing topographic maps, to identify conditions in which hazardous substances or petroleum products could migrate.

4.1.2 State and Local Records

The following information sources were consulted and searched as a part of the state and local agency review process:

a. Solid and Hazardous Waste Sites (SHWS);
b. Solid Waste Facilities/Landfill Sites (SWF/LF);

c. LDEQ Approved Debris Sites (DEBRIS);

d. Recycling Sites (SWRCY);

e. Leaking Underground Storage Tanks (LUST);
f. Historic Leaking Underground Storage Tanks (HIST LUST);

g. Louisiana Underground Storage Tank Database (UST);

h. Environmental Liens (LIENS);

i. Spills and Releases (SPILLS);

j. Listing of institutional and/or engineering controls (AUL);

k. Voluntary Remediation Program Sites (VCP);

l. Drycleaner Facility Listing (DRYCLEANERS);

m. LPDES Permits Database (NPDES).

4.1.3 Results

Site visits were made by CEMVN-PDC-CEC personnel on 13 February 2014 and 25 February 2014 of the structural and localized storm surgerisk reduction measures portions of the project as well as the Lutcher Polder mitigation area. Several oil and gas pipelines were noted to be within the footprint of the project features. These are considered potential RECs, and extreme caution shall be taken to prevent damage to or breakage of the pipelines during construction of the project.

A records search identified 4 Large Quantity Generators, 7 Small Quantity Generators (SQG), and 23 Conditionally Exempt SQGs within two miles of the project site. 47 toxic releases and 16 spills and accidents were reported from sites within two miles of the project site.

Several active and plugged and abandoned oil and gas wells located within two miles of the project site were also listed in the regulatory database. A large, 175 square acres surface impoundment associated with a fertilizer plant within one half mile of the project site was noted, as well. The impoundment is located to the west southwest of LA 3125 near Convent, LA. These findings should not be considered actual RECs, because no leaks or other problems have been reported concerning them. Therefore, they would not be expected to have any negative impacts on the project.

A records search for the Blind River mitigation area identified no RECs within two miles of the site.

Two potential RECs (plugged and abandoned dry hole oil and gas wells) were identified within the Bonnet Carre Spillway mitigation area. Caution must be taken to prevent damage to or breakage of the oil and gas well structures.

In addition to the well structures, seven Toxic Release Inventory (TRI) sites, fifty Emergency Response Notification System (ERNS) sites, ten Risk Management Plan (RMP) System sites, six Biennial Reporting System (BRS) sites, thirty-four Resource Conservation and Recovery Act (RCRA) hazardous waste handlers, one Comprehensive Environmental Response, Compensation, and Liability Information System site, and twenty-six National Pollutant Discharge and Elimination System (NPDES) sites within 2 miles of the Bonnet Carre Spillway mitigation area were identified in the records search. None of these sites, however, would be considered RECs that would affect or impact the project. These findings should be considered as *de minimis* conditions and not RECs; therefore, they would not be expected to have a negative impact on the project.

A records search for the Milton Island mitigation site identified two RCRA hazardous waste handlers, one CERCLIS site, and twenty NPDES facilities within two miles of the site. None of these sites, however, would be considered RECs that would affect or impact the project. These findings should be considered as *de minimis* conditions and not RECs; therefore, they would not be expected to have a negative impact on the project.

A records search for the Lutcher Polder mitigation site identified one potential REC (petroleum product pipeline) within the mitigation site. Caution must be taken to prevent damage to or breakage of the pipeline.

A records search for the Maurepas Crawfish Pond #1 mitigation site identified several potential RECs (petroleum product pipelines and plugged and abandoned oil and gas wells) within the Maurepas Crawfish Pond #1 mitigation site. Caution must be taken to prevent damage to or breakage of the oil and gas well structures.

In addition to the pipelines and well structures, two BRS sites, two RCRA hazardous waste handlers, and two NPDES sites within two miles of the Maurepas Crawfish Pond #1 mitigation site were identified in the records search. None of these sites, however, would be considered RECs that would affect or impact the project. These findings should be considered as *de minimis* conditions and not RECs; therefore, they would not be expected to have a negative impact on the project.

A records search for the Maurepas Crawfish Pond #2 mitigation site identified several potential RECs (petroleum product pipelines and one directionally drilled oil and gas well) within the mitigation site. Caution must be taken to prevent damage to or breakage of the oil and gas well structures.

In addition to the pipelines and well structures, two TRI sites, several ERNS (spill incidents) sites, two RMP facilities, three RCRA hazardous waste handlers, and five

NPDES sites were identified within two miles of the Maurepas Crawfish Pond #2 mitigation site. None of these sites, however, would be considered RECs that would affect or impact the project. These findings should be considered as *de minimis* conditions and not RECs; therefore, they would not be expected to have a negative impact on the project.

A records search for the Maurepas Crawfish Pond #3 mitigation site identified two potential RECs (petroleum pipelines) within the mitigation site. Caution must be taken to prevent damage to or breakage of the pipelines.

In addition to the pipeline, one TRI sites, several ERNS (spill incidents) sites, one BRS site, one RMP facility, and two RCRA hazardous waste handlers sites were identified within two miles of the Maurepas Crawfish Pond #3 mitigation site. None of these sites, however, would be considered RECs that would affect or impact the project. These findings should be considered as *de minimis* conditions and not RECs; therefore, they would not be expected to have a negative impact on the project.

4.2 Historical Use Information

The following historic information sources were obtained and reviewed: Historical aerial photographs from 1998 to 2013 were reviewed. The 2010 topographic maps were also reviewed as part of this investigation.

4.2.1 Aerial Photograph Review

1998 Aerial Photographs
The area surrounding the project site consists of mostly undeveloped marsh/wetland areas as well as acres of agricultural farmland. Several roads and structures exist along the localized storm surge risk reduction measures portions of the project as well as near the eastern and western parts of the proposed levee project.

2004 and 2005 Aerial Photographs
No significant changes appear to have occurred at the project site or the adjacent properties since the 1998 aerial photographs

2008 Aerial Photographs
No significant changes appear to have occurred at the subject site or the adjacent properties since the 2004 and 2005 aerial photographs.

2010 Aerial Photographs
No significant changes appear to have occurred at the project site since the 2008 aerial photographs.

2012 and 2013 Aerial Photographs
No significant changes appear to have occurred at the project site or the adjacent properties since the 2010 aerial photographs

4.2.2 Topographical Map Review

2010 Topographic Maps
Several roads, structures, refineries, oil and gas wells, a small airport, and acres of agricultural and vacant land are located adjacent to or near the project boundaries.

4.2.3 Sanborn Maps Review

No review of Sanborn Maps was conducted.

4.2.4 City Directory Review

No review of City Directories was conducted.

V. Site Reconnaissance

Site visits were conducted on 13 February 2014 and 25 February 2014. The project areas and surrounding properties were visually inspected for the presence of pipes, containers, tanks or drums, ponds or lagoons, car bodies, tires, refrigerators, trash dumps, electrical equipment, oil drilling equipment, gas or oil wells, discoloration of vegetation or water sheens, discoloration of soils, out-of-place dirt mounds or depressions in the landscape, evidence of fire, stressed soils with lack of vegetation, discoloration of vegetation, animal remains, unusual animal behavior, biota indicative of a disturbed environment, and odors indicative of poor water quality or chemical presence. Several oil and gas pipelines were noted in the project vicinity.

VI. Interviews

Property owners were not interviewed. This is considered a data gap.

VII. Findings

The site visits and records search identified numerous oil and gas wells and several oil and gas pipelines in and near the project area. Although no leaks or other problems have been reported from these facilities, they are considered to be potential RECs, and extreme care should be observed to avoid damaging any pipelines traversing the project area.

The site visits and environmental records search did not identify any other significant data suggesting environmental concerns in the structural and localized storm surge risk reduction measures project areas.

The records search for the Blind River and Milton Island mitigation sites did not identify any RECs.

The records search did identify two plugged and abandoned dry hole oil and gas wells within the Bonnet Carre Spillway mitigation site, one petroleum product pipeline within the

Lutcher Polder site, and several petroleum product pipelines, plugged and abandoned oil and gas wells, and one active oil and gas well within the Maurepas Crawfish Ponds mitigation areas. All of the pipelines and well structures are considered to be potential RECs and caution must be taken to prevent damage to or breakage of the well structures.

VIII. Opinion

A Phase I ESA was conducted in conformance with the scope and limitations of ASTM Practice E 1527-05 for the West Shore Lake Pontchartrain project. This assessment has revealed several potential RECs in connection with the project sites in the form of oil and gas pipelines. The assessment also revealed the existence of several petroleum product pipelines, plugged and abandoned oil and gas wells, and one active oil and gas well within the Bonnet Carre Spillway mitigation site, the Lutcher Polder mitigation site, and the Maurepas Crawfish Ponds mitigation sites. Extreme caution shall be taken to prevent damage to or breakage of the pipelines and well structures during construction of the project. Otherwise, there is a low probability of encountering HTRW in connection with this project.

IX. Conclusions

A Phase I ESA was conducted in accordance with the scope and limitations of ASTM Practice E 1527-05 for the West Shore Lake Pontchartrain. Pipelines and oil and gas well structures must be avoided during construction of the project. Otherwise, there is a low probability of encountering HTRW in connection with this project. No further investigation at the site is recommended. If the proposed project area changes, the HTRW probability may need to be re-investigated.

X. Limitations

U.S. Army Corps of Engineers, Environmental Quality Section, should be contacted with any known or suspected variations from the conditions described herein. If future development of the property indicates the presence of hazardous or toxic materials, USACE should be notified to perform a re-evaluation of the environmental conditions.

The scope of this assessment did not include any additional environmental investigation not outlined herein or analyses for the presence or absence of hazardous or toxic materials in the soil, ground water, surface water, or air, in, on, under, or above the subject tract.

This site assessment was performed in accordance with generally accepted practices of consultants undertaking similar studies at the same time and in the same geographical area, and USACE observed that degree of care and skill generally exercised by consultants under similar circumstances and conditions. The findings and conclusions stated herein must be considered not as scientific certainties, but rather as professional opinions concerning the significance of the limited data gathered during the course of the environmental site assessment. No other warranty, expressed or implied, is made. Specifically, USACE does not and cannot represent that the site contains no hazardous waste or material, oil (including petroleum products), or other latent conditions beyond that observed by USACE during its site assessment.

The observations described in this report were made under the conditions stated herein. The conclusions presented in the report were based solely upon the services described therein, and not on scientific tasks or procedures beyond the scope of described services. Furthermore, such conclusions are based solely upon site condition and rules and regulations which were in effect at the time of the study.

In preparing this report, USACE relied on certain information provided by state and local officials and other parties referenced therein, and on information contained in the files of state and/or local agencies available to USACE at the time of the site assessment. Although there may have been some degree of overlap in the information provided by these various sources, no attempt was made to independently verify the accuracy or completeness of all information reviewed or received during the course of this site assessment.

Observations were made of the site, as indicated within the report. Where access to portions of the site was unavailable or limited, USACE renders no opinion as to the presence of indirect evidence relating to hazardous waste or material or oil, or other petroleum products, in that portion of the site or structure.

Unless otherwise specified in the report, USACE did not perform testing or analyses to determine the presence or concentration of asbestos, radon, formaldehyde, lead-based paint, lead in drinking water, or electromagnetic fields (EMFs) at the site or in the environment near the site.

The purpose of this report was to assess the physical characteristics of the subject site with respect to the presence in the environment of hazardous, toxic, or radioactive waste or material, oil, or petroleum products. No specific attempt was made to check on the compliance of present or past owners or operators of the site with federal, state, or local laws and regulations, environmental or otherwise.

XI References

• E 1527-05: Standard Practice for Environmental Site Assessments – Phase I Environmental Site Assessment Process. American Society for Testing and Materials, International (ASTM); West Conshohocken, Pennsylvania; 2005

XII Qualifications

Joseph Musso
Environmental Resource Specialist
US Army Corps of Engineers
New Orleans District
New Orleans, Louisiana

Work Experience:

Mr. Musso has over 28 years of experience as an environmental specialist in both the private and public sector. He has actively participated in projects related to toxic and hazardous waste site evaluation, hydrocarbon site assessments, air quality projects, surface water quality

projects, Solid and Hazardous Waste management programs, and Pollution Prevention Plans. He is experienced in a wide range of environmental applications, including environmental management at the state and federal levels, compliance of facilities for industrial, domestic, and storm water regulations, and requirements for groundwater monitoring plans. He has also directed multi-disciplinary environmental projects for private industry and the public sector.

Mr. Musso has the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject properties and declares that, to the best of his professional knowledge and belief, he meets the definitions of Environmental Professionals as defined under 40 CFR 312.

Academic Background:

B.S. Geology
University of New Orleans
1983

XIII Appendices

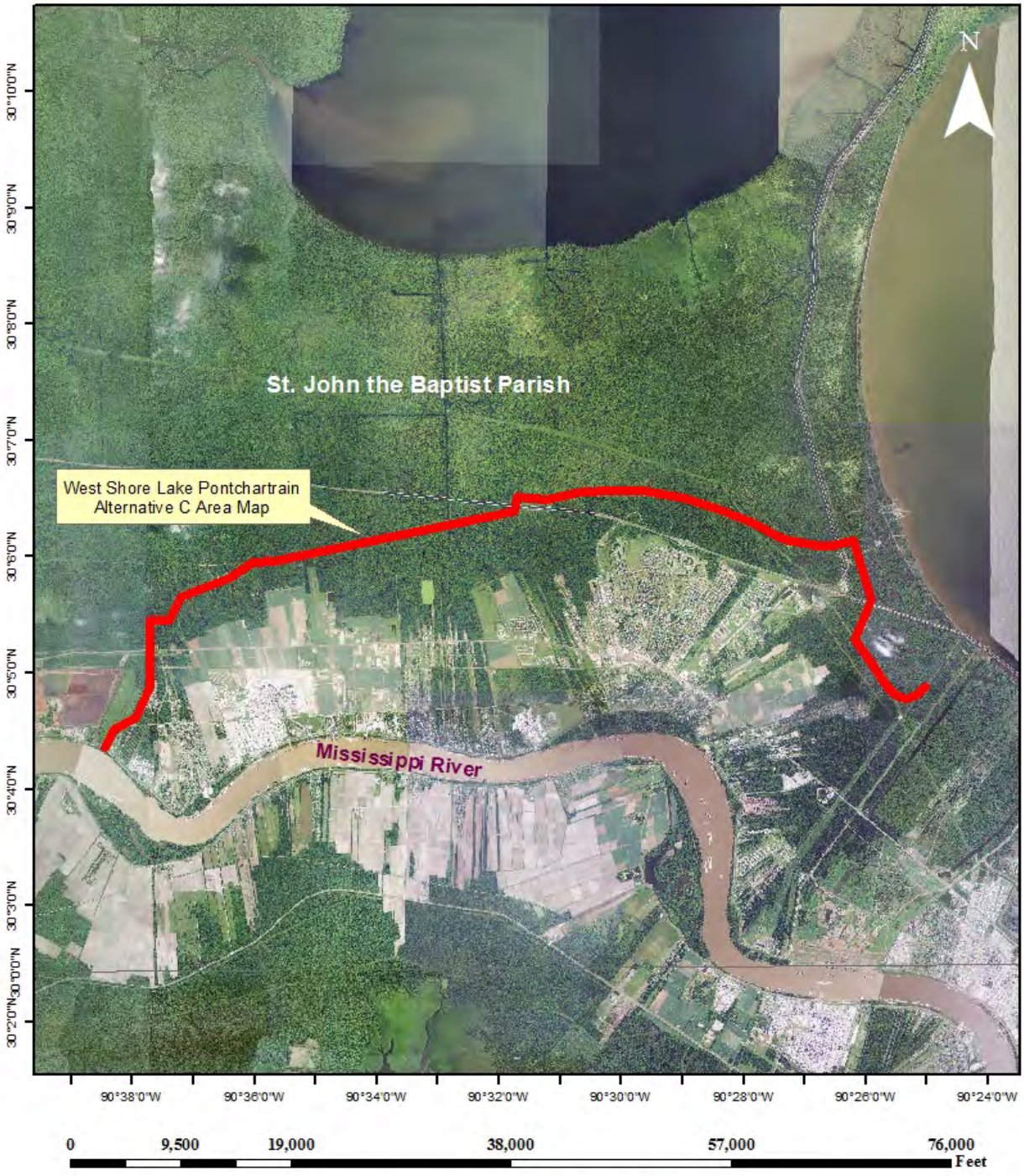
Appendix A – Site Map

Appendix B – Photographs

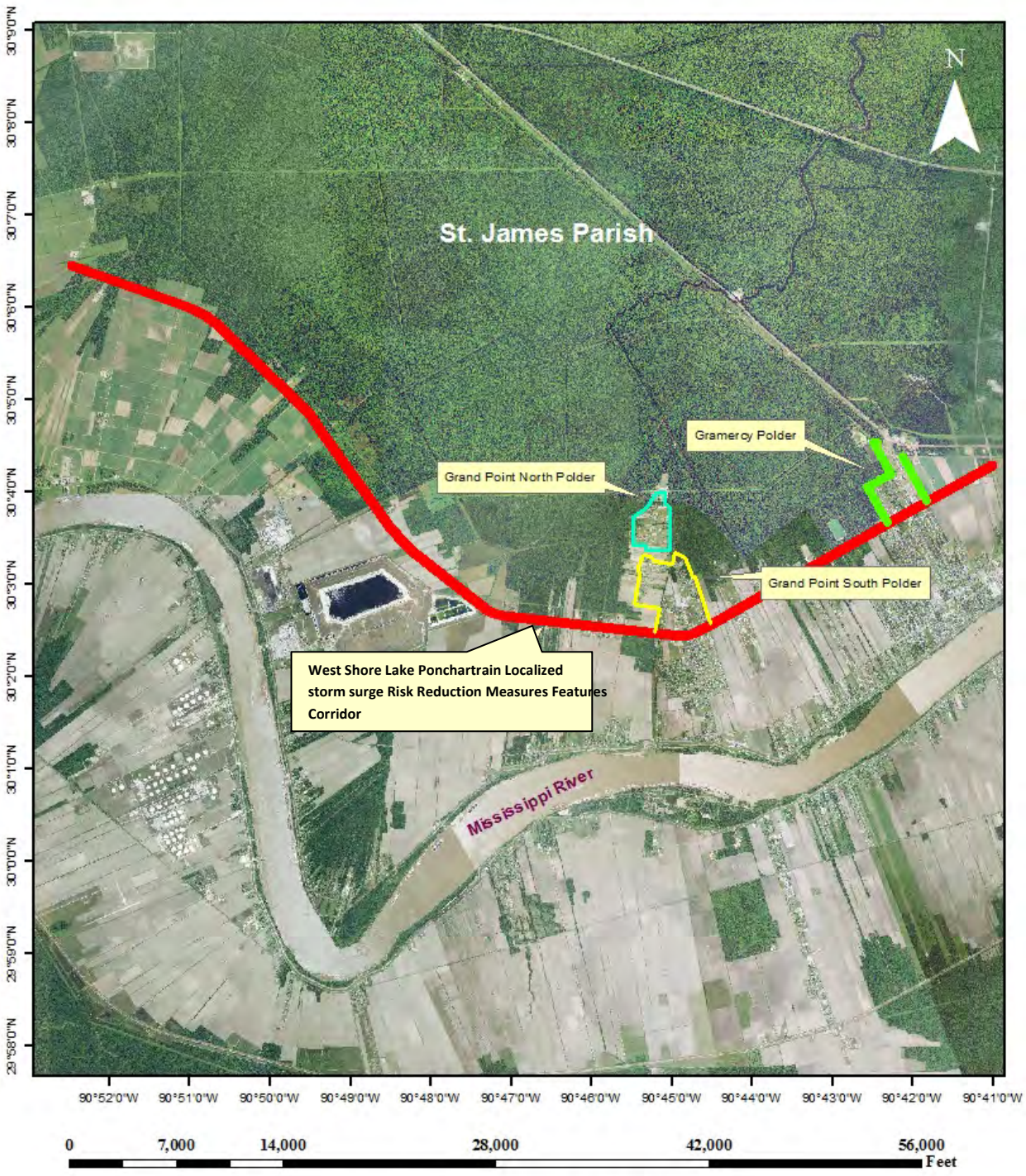
Appendix C – Environmental Data

Appendix A

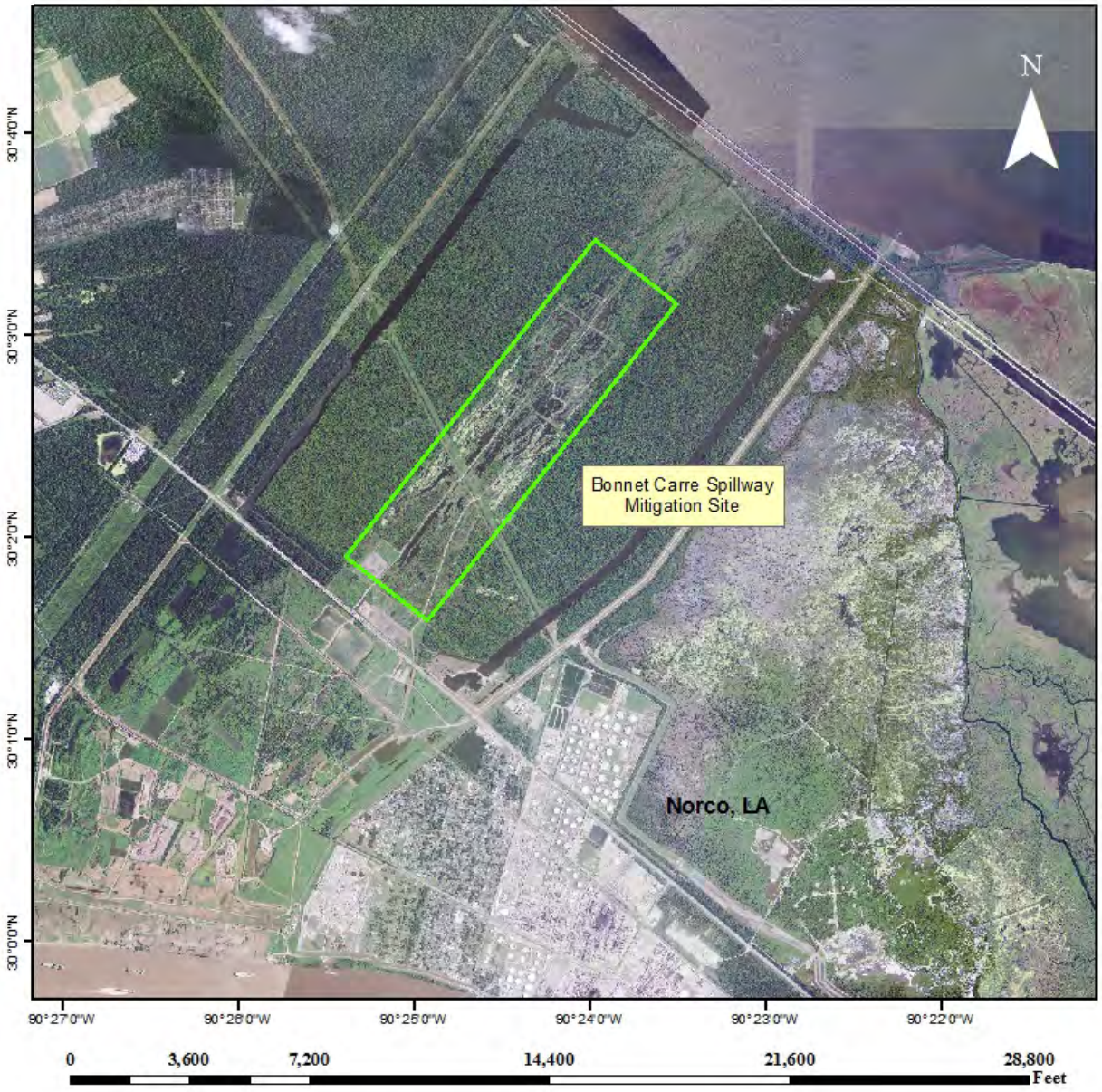
Site Map



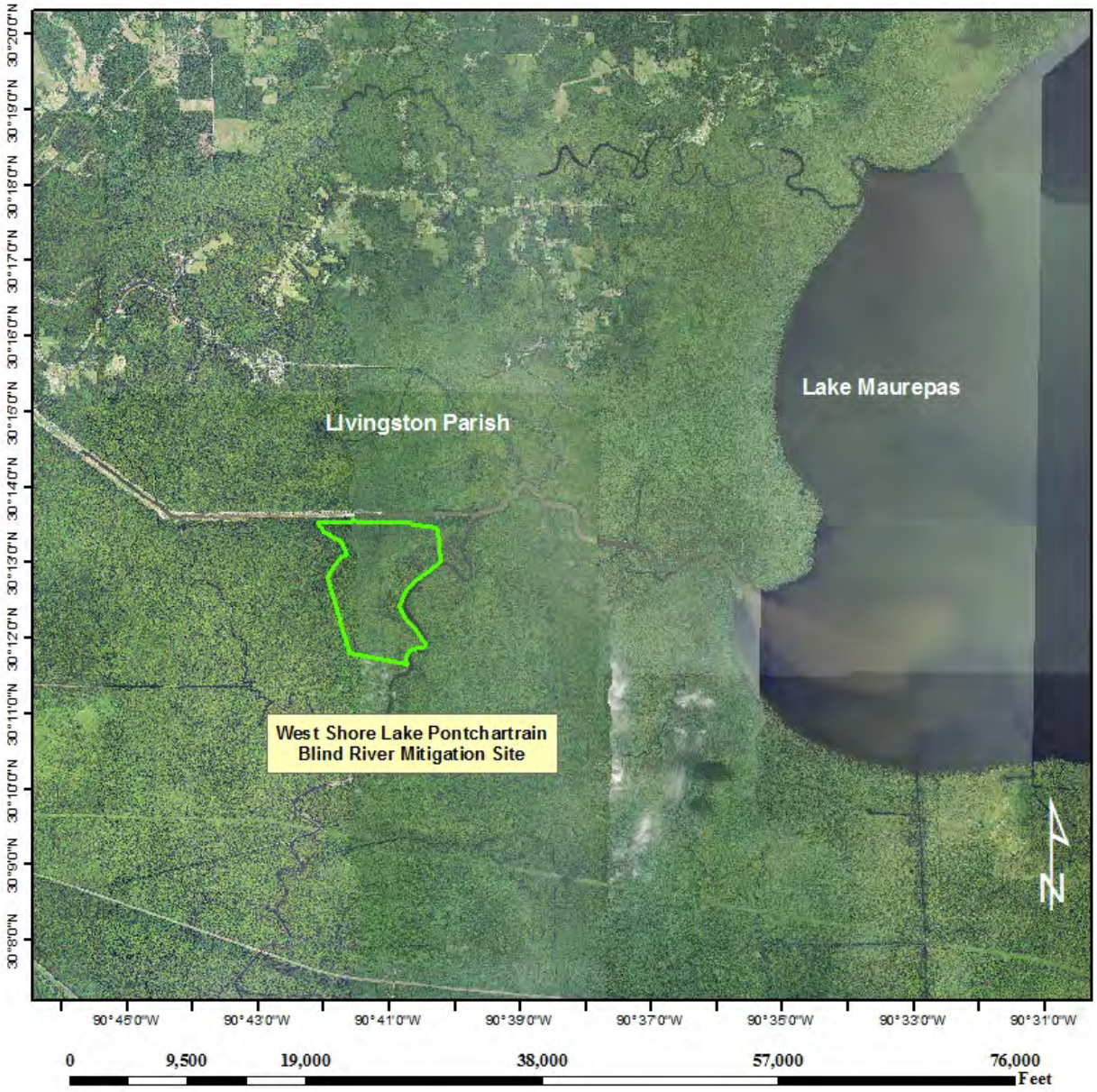
West Shore Lake Pontchartrain
Alternative C Area Map



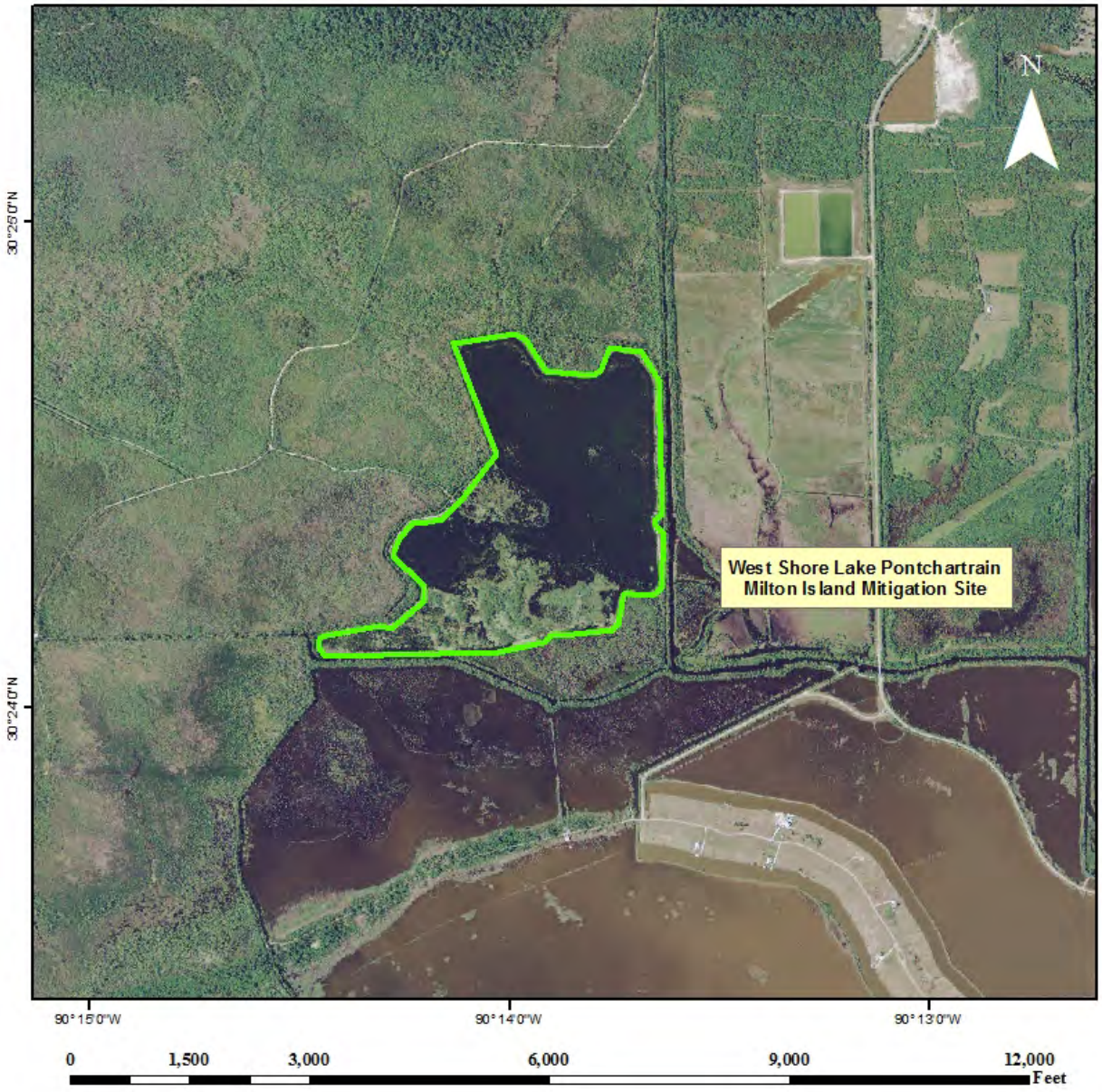
West Shore Lake Ponchartrain Localized {úƧ₂ℕY {ᵭƵℕƎŜ Risk Reduction Measures Area Map



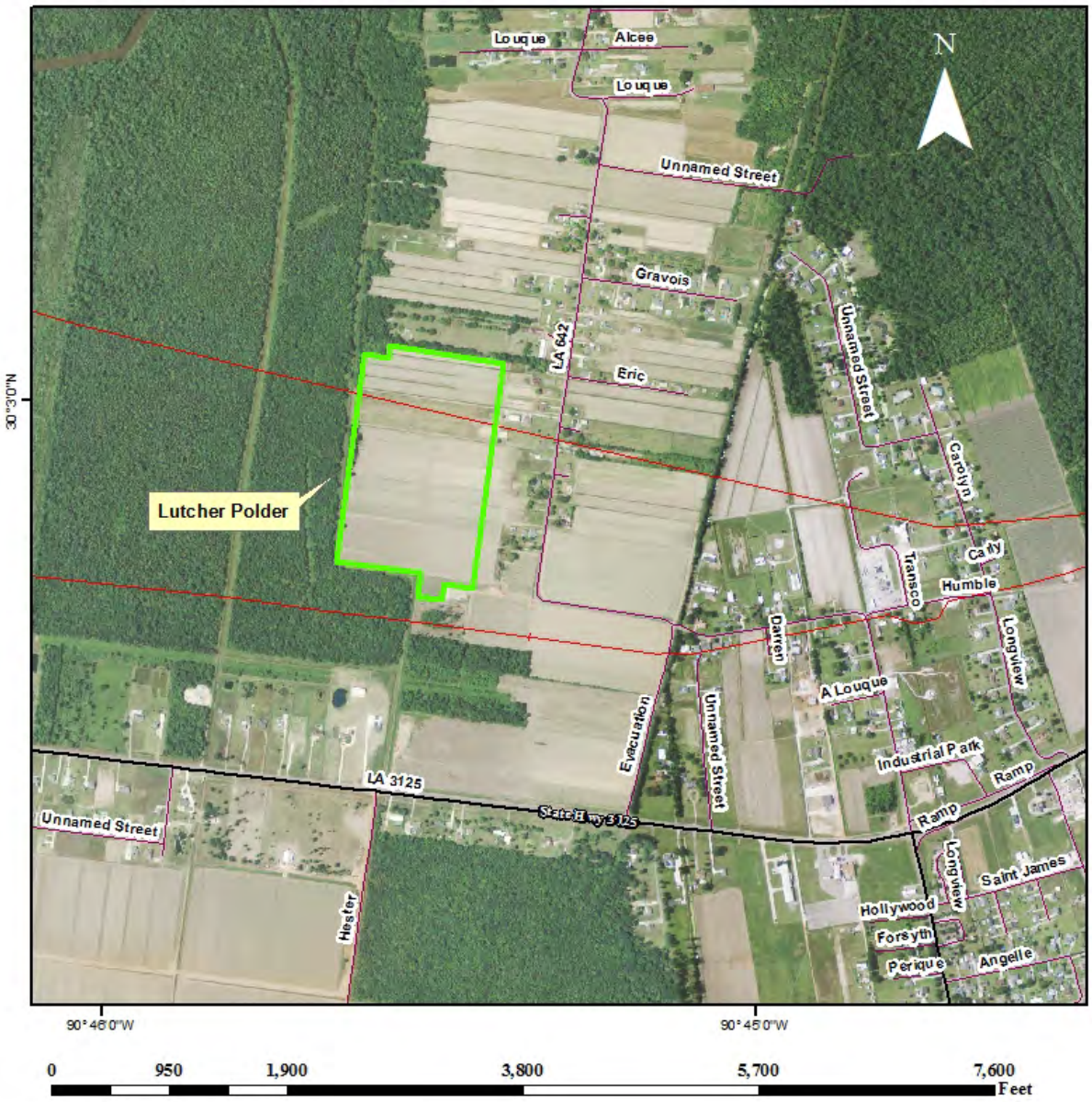
West Shore Lake Pontchartrain
Mitigation Site
Bonnet Carre Spillway



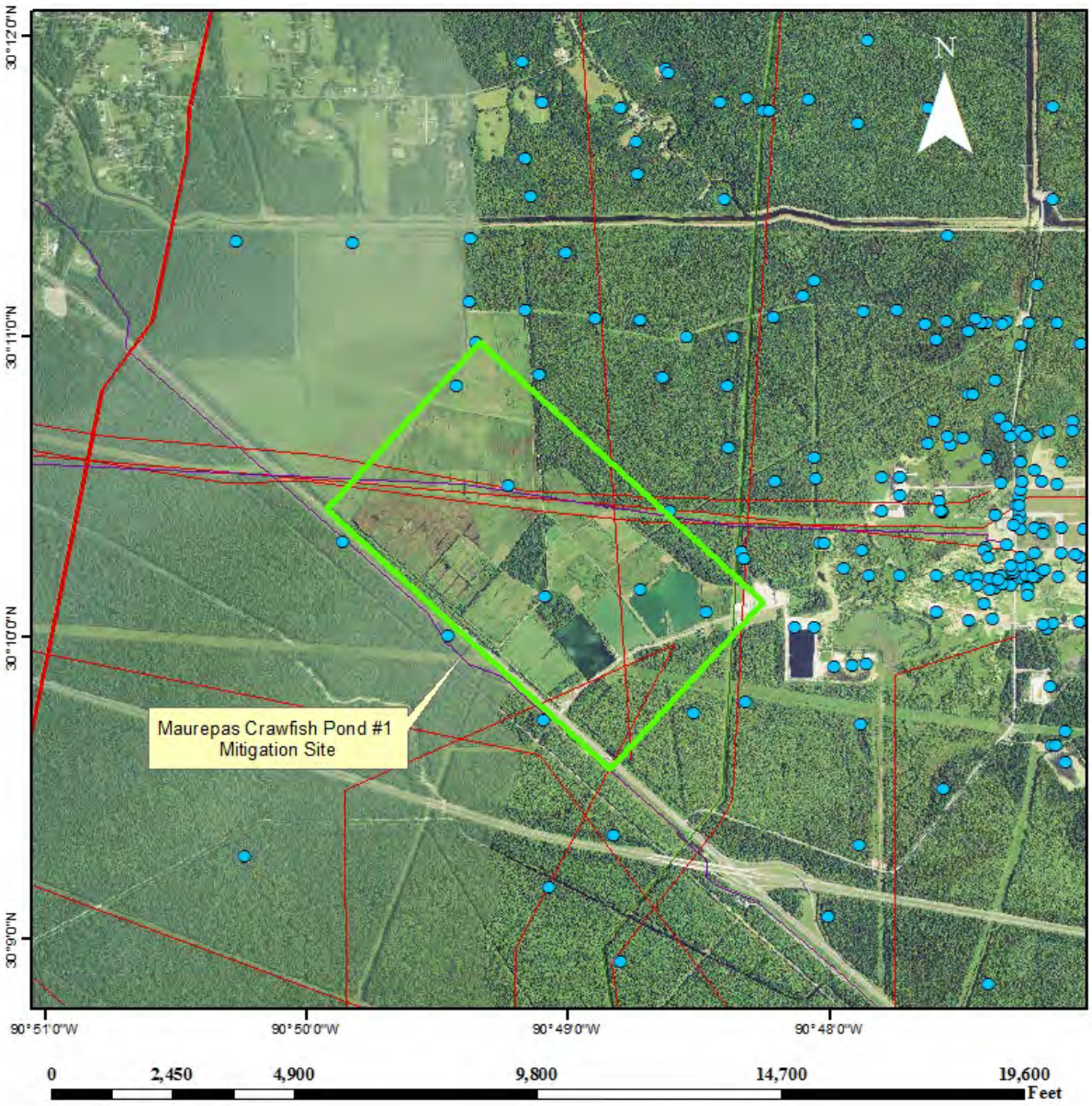
West Shore Lake Pontchartrain
Blind River Mitigation Site



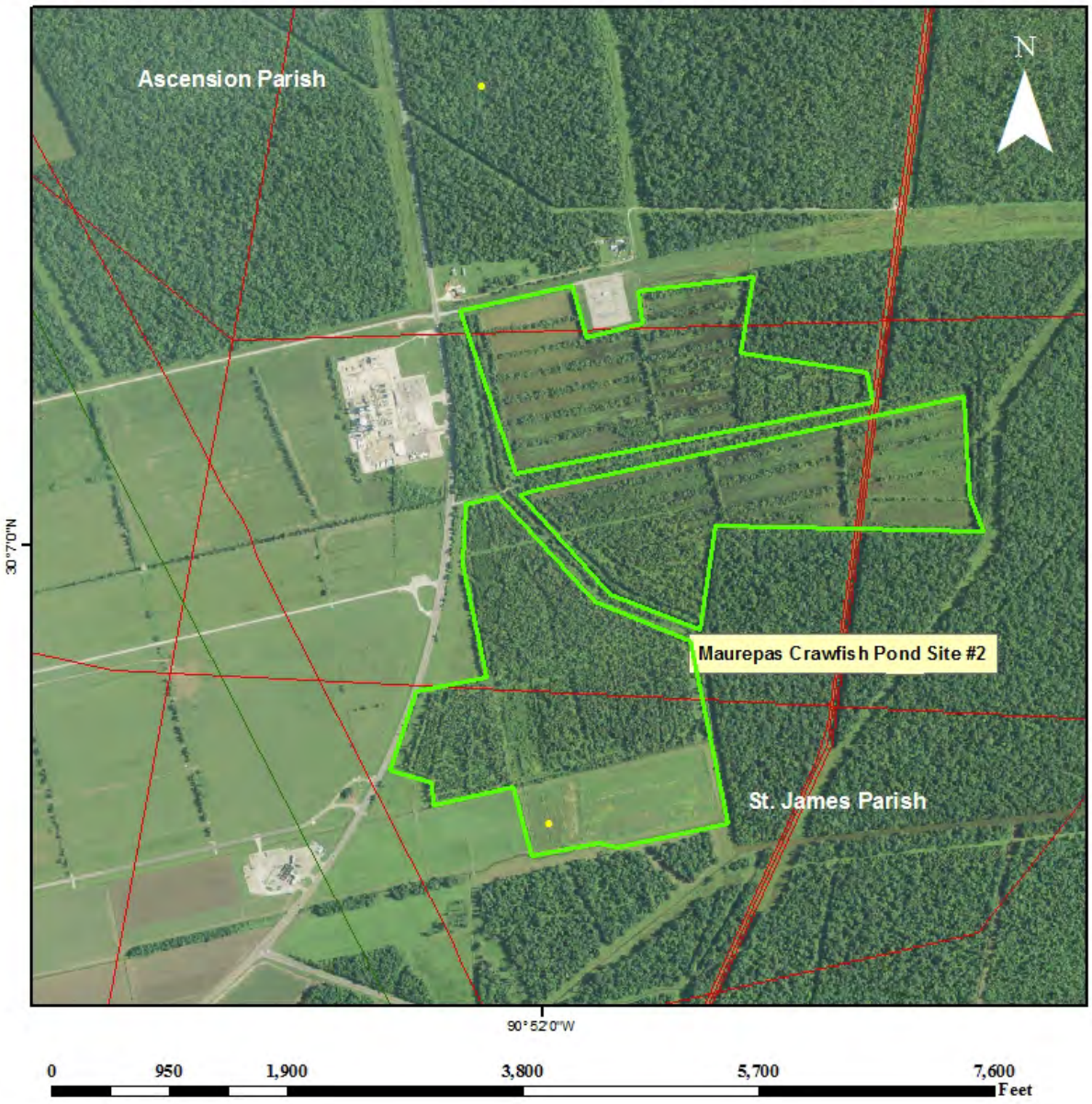
West Shore Lake Pontchartrain
Milton Island Mitigation Site



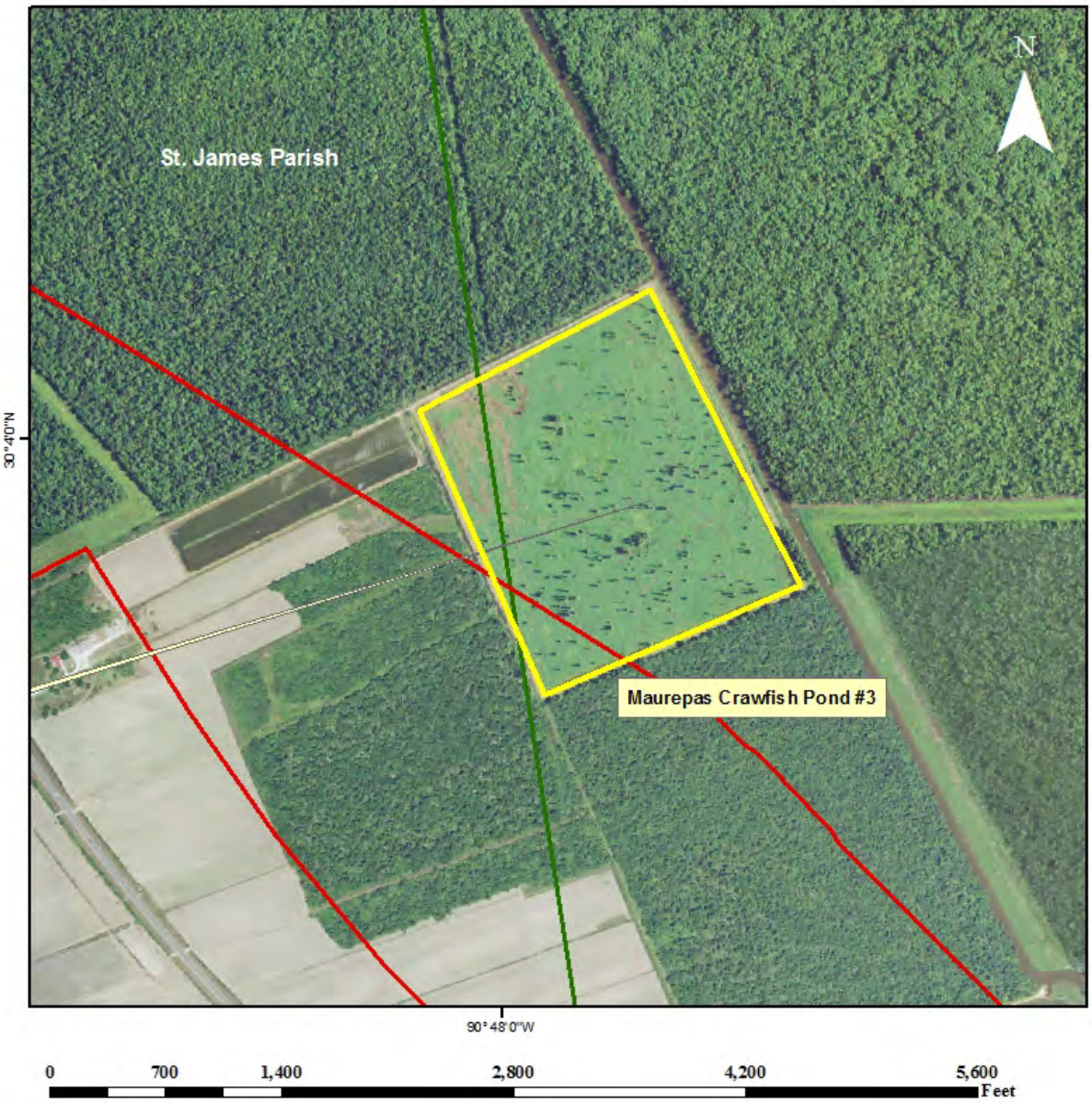
WSLP Mitigation Sites
Lutcher Polder with Pipeline
St. James Parish



WSLP Mitigation Sites
Maurepas Crawfish Pond #1
Pipeline and Well Locations



WSLP Mitigation Sites
Maurepas Crawfish Pond #2
With Pipelines and Wells



WSLP Mitigation Sites
Maurepas Crawfish Pond #3 With Pipelines

Appendix B

Photographs

Photograph 1: West Shore Lake Pontchartrain (WSLP) Alternative C near I-55 facing west

Photograph 2: WSLP Alternative C near I-55, trash and debris facing northwest

Photograph 3: WSLP Alternative C near I-55, trash and debris facing east

Photograph 4: WSLP Alternative C north of I-10 facing south

Photograph 5: WSLP Alternative C north of I-10 facing south

Photograph 6: WSLP Alternative C north of I-10 facing north

Photograph 7: WSLP Alternative C Airline Hwy. crossing facing south

Photograph 8: WSLP Alternative C Airline Hwy. crossing facing north

Photograph 9: WSLP Alternative C alignment facing northwest

Photograph 10: WSLP Alternative C alignment facing west

Photograph 11: WSLP Alternative C alignment at River Rd. facing north

Photograph 12: WSLP Localized storm surge risk reduction measures plan Gramercy Polder area facing west

Photograph 13: WSLP Localized storm surge risk reduction measures plan Gramercy Polder area facing west

Photograph 14: WSLP Localized storm surge risk reduction measures plan Gramercy Polder area facing east

Photograph 15: WSLP Localized storm surge risk reduction measures plan Gramercy Polder area facing east

Photograph 16: WSLP Localized storm surge risk reduction measures plan, Hwy. 3125 facing west,
residential area south of Hwy. 3125

Photograph 17: WSLP Localized storm surge risk reduction measures plan, gas station south of Hwy. 3125, facing south

Photograph 18: WSLP Localized storm surge risk reduction measures plan, restaurant and gas station south of Hwy. 3125, facing south

Photograph 19: WSLP Localized storm surge risk reduction measures plan, Grand Point South Polder area facing west

Photograph 20: WSLP Localized storm surge risk reduction measures plan, Grand Point North Polder area facing west

Photograph 21: WSLP Localized storm surge risk reduction measures plan, Grand Point North Polder area facing east

Photograph 22: WSLP Localized storm surge risk reduction measures plan, Grand Point South Polder area facing east

Photograph 23: WSLP Localized storm surge risk reduction measures plan, along Hwy. 3125 facing west

Photograph 24: WSLP Localized storm surge risk reduction measures plan, along Hwy. 3125, Mosaic Chemical Plant, notice pipeline marker, facing west

Photograph 25: WSLP Localized storm surge risk reduction measures plan, along Hwy. 3125, notice pipeline marker, facing west

Photograph 26: WSLP Localized storm surge risk reduction measures plan, along Hwy. 3125, facing southwest

US Army Corps
of Engineers®

WEST SHORE LAKE PONTCHARTRAIN HURRICANE AND STORM DAMAGE RISK REDUCTION PROJECT

Project Cost and Schedule Risk Analysis Report

Prepared for:
U.S. Army Corps of Engineers
Mississippi Valley Division
New Orleans District

Prepared by:
New Orleans District

Date: **27 JUN 2014**

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1
1. PURPOSE 4
2. BACKGROUND 5
3. REPORT SCOPE 7
3.1 Project Scope 7
3.2 USACE Risk Analysis Process 8
4. METHODOLOGY/PROCESS 9
4.1 Identify and Assess Risk Factors 10
4.2 Quantify Risk Factor Impacts 11
4.3 Analyze Cost Estimate and Schedule Contingency 12
5. KEY ASSUMPTIONS 13
6. RISK ANALYSIS RESULTS 14
6.1 Risk Register 14
6.2 Cost Risk Analysis - Cost Contingency Results 15
6.3 Schedule Risk Analysis - Schedule Contingency Results 17
6.4 Combined Cost and Schedule Contingency Results 19
7. MAJOR FINDINGS/OBSERVATIONS 20
8. MITIGATION RECOMMENDATIONS 24

LIST OF TABLES

Table 1 Construction Contingency Results ..... **Error! Bookmark not defined.**
Table 2 Project Cost Confidence Table ..... **Error! Bookmark not defined.**
Table 3 Project Schedule Confidence Table 19
Table 4 Combined Confidence Table 20
Table 5 Project Contingencies 21

LIST OF FIGURES

Figure 1 Area Storm Surge Patterns 4
Figure 2 West Shore Lake Pontchartrain Authorized Study Area..... 6
Figure 3 Project Cost Sensitivity Chart..... 16
Figure 4 Project Schedule Sensitivity Chart 18
Figure 5. Sample of Project Confidence Curves ..... **Error! Bookmark not defined.**

APPENDIX

APPENDIX A Detailed Risk Register

EXECUTIVE SUMMARY

The US Army Corps of Engineers (USACE), New Orleans District, presents this cost and schedule risk analysis (CSRA) report regarding the risk findings and recommended contingencies for the Presque Isle Shoreline Erosion Control Project. In compliance with Engineer Regulation (ER) 1110-2-1302 CIVIL WORKS COST ENGINEERING, dated September 15, 2008, a formal risk analysis, *Monte-Carlo* based-study was conducted by the Project Development Team (PDT) on remaining costs. The purpose of this risk analysis study is to present the cost and schedule risks considered, those determined and respective project contingencies at a recommended 80% confidence level of successful execution to project completion.

The risk analysis is based upon the recommended plan of 18.27-mile levee around Montz, Laplace, Reserve and Garyville, reducing risk to over 7,000 structures. Additionally, four miles of I-10 flooded during Hurricane Isaac is within the proposed system. The plan includes non-structural measures for 1,571 structures in Gramercy, Lutcher and Grand Point. The estimated base cost, excluding contingencies approximates $560M which includes:

- 01 Lands and Damages
- 02 Relocations
- 06 Fish and Wildlife
- 11 Levees and Floodwalls
- 13 Pumping Plant
- 30 Planning, Engineering and Design (PED)
- 31 Construction Management

.

Of the above, the 01 Lands and Damages and the 06 Fish and Wildlife contingencies were provided by others. This risk analysis was devoted to the main construction features: Relocations, Levees and Floodwalls and Pumping Plants, approximating $400M. The other costs excluded from this study are the PED and Construction Management costs. Those two costs, based as a percent of the construction base costs, received the same applied contingency percent.

Cost estimates fluctuate over time. During this period of study, minor cost fluctuations can and have occurred. For this reason, contingency reporting is based in cost and per cent values. Should cost vary to a slight degree with similar scope and risks, contingency per cent values will be reported, cost values rounded. The study resulted in a 29% contingency with an 80% confidence level of successful project completion.

Table 1 Construction Contingency Results

Confidence Level	Base Cost	Contingency $	Contingency (%)
5%	$381,341,070	$50,845,549	13.33%
50%	$381,341,070	$91,328,758	23.95%
80%	$381,341,070	$115,043,125	30.17%
90%	$381,341,070	$126,816,303	33.26%

KEY FINDINGS/OBSERVATIONS RECOMMENDATIONS

The PDT worked through the risk register in February 2014, focusing on construction, contract acquisition, design, project management, programmatic and construction management risks. The study outcome identified key cost and schedule risks resulting in an approximate 30% contingency of the costs studied.

Cost Risks: From the CSRA, the key or greater identified Cost Risks include:

- (CON-1) Construction Contract Modifications – Technical complexities and site conditions could result in increased risk of contract modifications. Detailed geotechnical and hydraulic investigations may reduce these risks.

- (TL-4) Borrow Sources Identified/Secured – The uncertainty of a secured borrow source for the last five lifts. Alternative borrow sources may need to be approved in order to reduce this risk.

- CA-1 Contract Acquisition Impacts – Type of contracts and possible impacts to cost and schedule. Early PDT involvement with Contracting and Project Management may lessen the risks and solidify the types of solicitations.

- TL-2 Design Development – Design details for the structural elements whether preliminary or detailed and their impact to costs. Further investigations in the design phases may lessen this risk.

- EST-1 Labor & Equipment Availability/Pricing – Variances in availability of equipment and labor throughout the project and impacts to costs.

- EST-3 Estimate quality when developed by others – Inaccuracies due to a large use of lump sums in the MII could cause changes to cost. Further design and additional QC/QA may reduce this risk.

- PR-1 Funding Availability for PED and Construction – Impacts to costs due to funding variances causing delays and escalation of costs.

- PR-4 Fuel Cost – Fuel price variances impacts to construction costs.

Schedule Risks: Schedule risks indicate a duration uncertainty which can also be translated into cost impacts. The greatest identified schedule risks include:

- CA-2 Numerous Separate Contracts – Numerous separate contracts increases the risks of protests, access to projects choke points, multiple contractor coordination.

- PPM-2 Smart Planning Pilot – Impacts to schedule due to unplanned work or requests for additional modeling/investigations under PED.

- PPM-3 Funding Availability at Pre-solicitation Stage – Impacts to schedule due to lack of funding during PED.

- PR-1 Funding Availability for PED and Construction – Impacts to schedule due to funding variances causing delays and increased costs

- PR-6 Stakeholder Request Late Changes – Additional work or alignment changes would impact costs and increase schedule delays.

Recommendations: Further iterative project and risk study is important throughout the project life-cycle in order to efficiently manage and maintain a reasonable cost and schedule. Certain risks are outside the PDT control, while certain risks can be managed to lessen impact in cost and time. The more critical items that warrant attention are:

- Work to identify and procure quality borrow sources close to the project location. This brings dividends related to haul time and productivity. Closer borrow sources are key in decreasing the cost and risk impacts to this project.

- Identify and resolve the mitigation requirements and concerns in order to gain a better understanding of cost implications.

1. PURPOSE

The study purpose is to provide a recommendation for Federal participation in hurricane storm damage risk reduction for St. Charles, St. John the Baptist and St. James Parishes that would be economically and environmentally justified. The study addresses flooding caused by storm surge but does not address rainfall flooding. There have been significant changes over the last 40 years, especially since Hurricane Katrina. Population has grown over the past few decades. This report presents a collaboratively-developed plan prepared in accordance with the National Environmental Policy Act (NEPA) and Engineering Regulation 1105-2-100, the USACE Planning Guidance Notebook. It consists of a main report and appendices, and identifies the expected benefits, estimated cost and implementation responsibilities for a tentatively selected plan (TSP). The report provides an overview of the study and summarizes detailed information found in technical appendices. The report is an interim response to the study authority. Flooding cause by storm surge damages homes, businesses and infrastructure. Surge travels from the Gulf of Mexico into the basin and floods the three study area parishes and beyond (Figure 1-3).

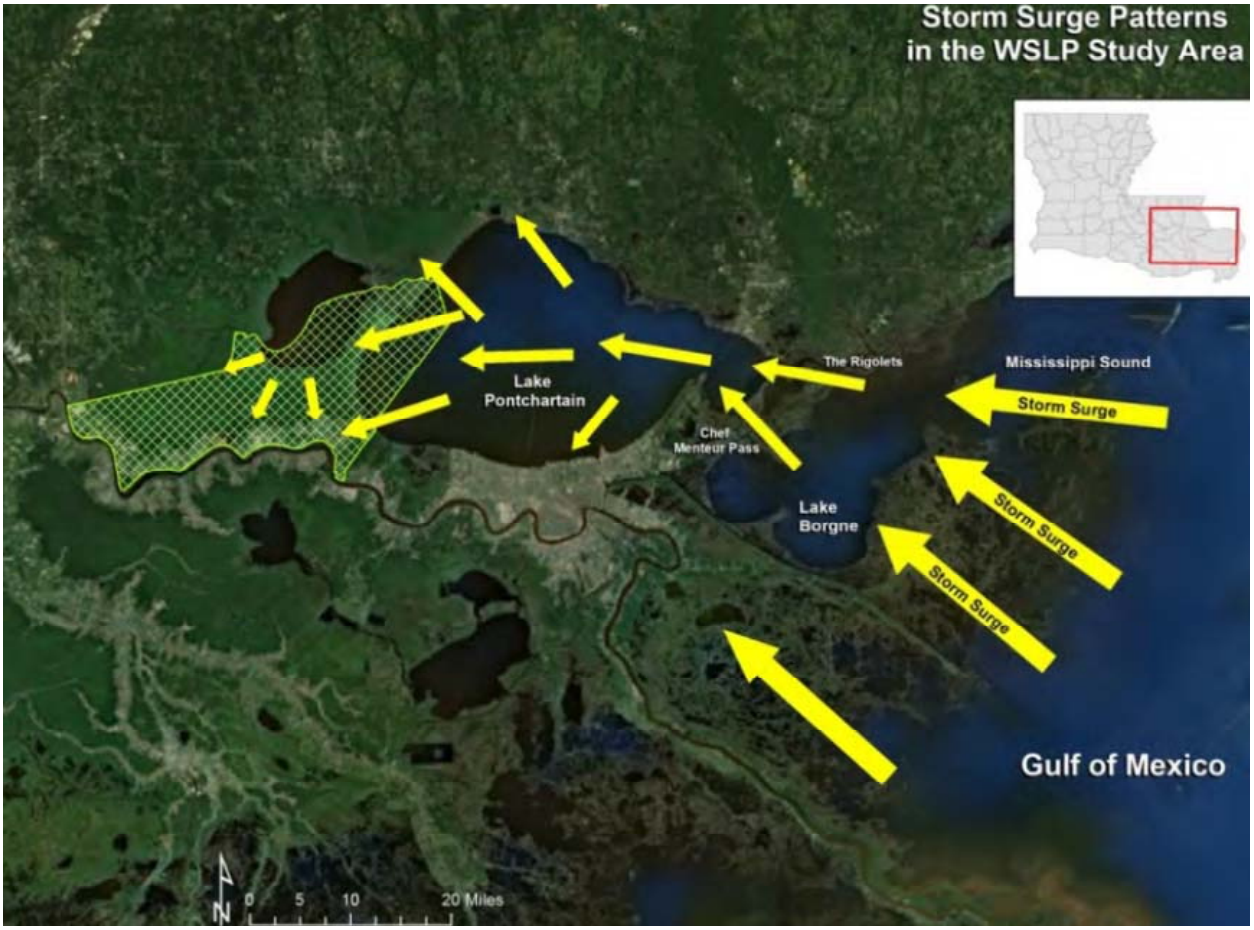


Figure 1 Area Storm Surge Patterns

Since 1855, 70 hurricanes have made landfall within 65 nautical miles of Laplace. Hurricanes Betsy (1965), Camille (1969), Juan (1985), Andrew (1992), Katrina and Rita (2005), Gustav and Ike (2008), and Isaac (2012) caused storm surge flooding. Hurricane Isaac's surge, measured from 6 to 8 feet in the area, threatened lives and damaged more than 7,000 homes, closed roads and disrupted the Nationally-significant energy industry. Businesses and workers serving the Port of South Louisiana are located in the area. The port is the largest volume port in the Western Hemisphere and the ninth largest in the world. It stretches 54 miles on the Mississippi River between New Orleans and Baton Rouge. Hurricane Isaac disrupted port logistics. Its storm surge blocked facility access closing the port. Oil refineries, including the Nation's third largest, were shutdown. Gasoline production stopped. Regional and National fuel prices spiked. The storm caused extensive agricultural losses due to an inability to drain storm surge water from fields.

The study area setting offers bounty of natural resources but it was historically subject to flooding from the river and nearby lakes. Levees were constructed along the Mississippi River starting in the 1700s to combat annual floods. These levees allowed settlement of the area and agricultural production and the harvesting of natural resources. The area remains susceptible to floods from tropical storms and hurricanes. Some natural protection is afforded by large cypress swamp that separates developed areas from nearby tidal lakes. The swamp has degraded over time and the buffer it provides between the lakes and towns is decreasing. As a result, flooding from storm surge (Figure 1-3) remains a risk that is expected to increase over time. The management of Mississippi River flood risk, and the accompanying development of interior drainage systems, allowed urban and suburban expansion in much of the region beyond the natural high-ground near the Mississippi River. Population has increased with suburban development between Baton Rouge and New Orleans. Residents are attracted to the area because of employment opportunities, quality of life, and access to recreation. These factors, increasing population and degrading natural buffers, combine to increase storm surge flooding risks.

2. BACKGROUND

The study area (Figure 1-1) is located in southeast Louisiana between the Mississippi River, and Lakes Maurepas and Pontchartrain.

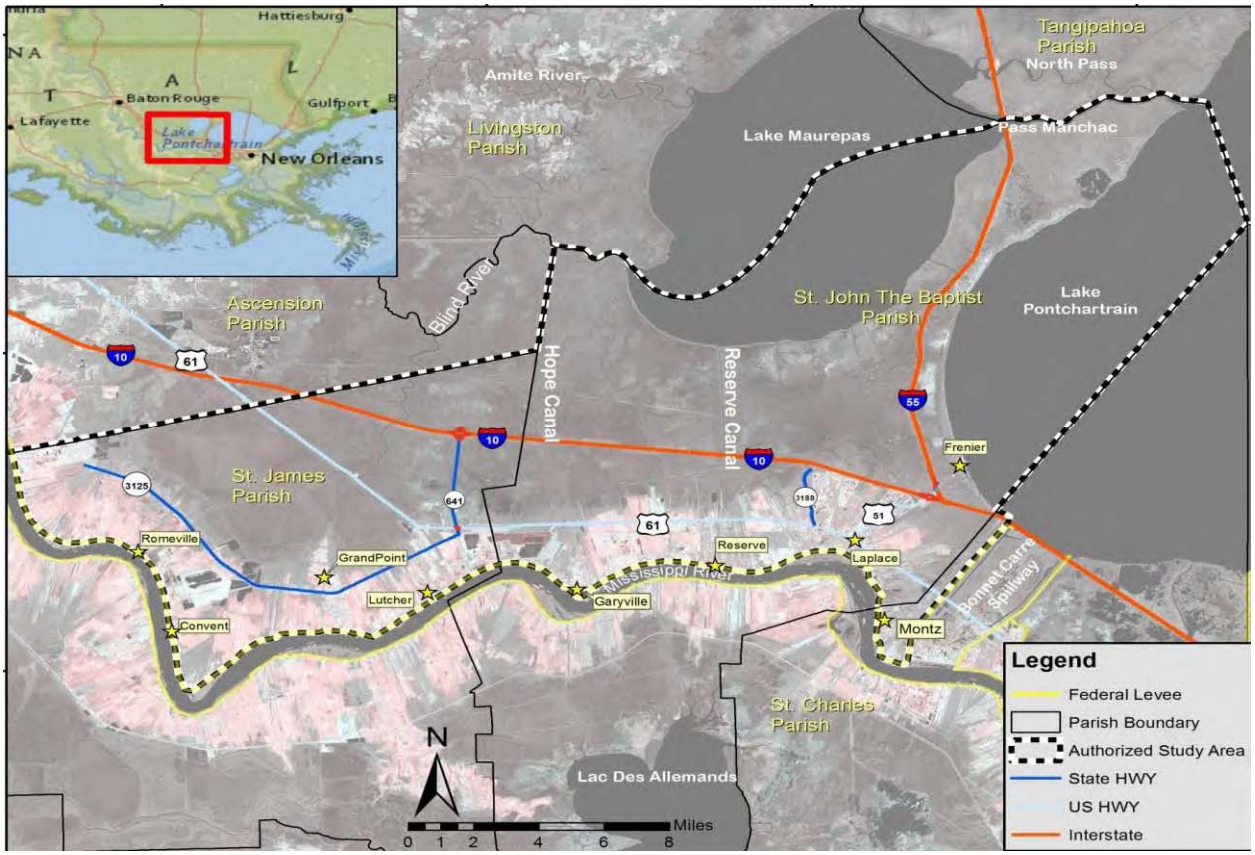


Figure 2 West Shore Lake Pontchartrain Authorized Study Area

The towns of Montz, Laplace, Reserve, Lutcher,
Gramercy, Grand Point, Convent, Garyville and Romeville are area communities. The 184,351 study acre area occupies a portion of one of the oldest delta complexes in the Mississippi River Deltaic Plain. It is located in the lower Mississippi River alluvial plain in the Pontchartrain Basin. The area includes residential and commercial developments south of Interstate 10 (I-10). West of Laplace, a majority of the developed areas are found between U.S. Highway 61 (US-61) and the Mississippi River levee. The area north of I-10 comprises the State of Louisiana's Maurepas Swamp Wildlife Management Area (WMA). The project area includes lands potentially impacted by the proposed action. Hurricane or tropical storm winds push on the ocean's surface, causing a rise of water over and
above the predicted tide. This is called storm surge. Hurricanes and tropical storms are an important part of Louisiana's history and culture. The region experiences tropical waves, depressions, storms and hurricanes. The study area is highly susceptible to storm surge. The destruction caused by a 1915 hurricane was recounted years later:
"… an enormous storm surge advanced with great rapidity upon the western shore of Lake Pontchartrain well ahead of the eye of the hurricane which very nearly struck Frenier head on. As the storm came ashore in the New Orleans area, fifty people drowned as a thirteen foot storm surge swept the Rigolets railroad bridge away. It should also be emphasized that damage and destruction to homes and property were occurring even as the eye of the hurricane was 165 miles from Frenier. Two-hundred seventy-five Louisianians lost their lives

as a result of the "Great West Indian Hurricane of 1915." (Landry 1996)
Recent hurricanes impacting the area include Katrina and Rita in 2005, Gustav and Ike in 2008, and Isaac in 2012. These storms threatened a region that plays a vital national economic role and that serves as a key transportation corridor.
An important swamp buffer separating development from nearby lakes has been impacted over time. The closure of bayous and the construction of levees cut off the annual flooding that historically nourished and maintained the cypress/tupelo habitat in the Maurepas Swamp. The cypress forests of the swamp were logged in the 1890s –1930s. Canals and railroads were built through the swamp to remove cut timber (Figure1-2). The swamp is converting to fragmented marsh and open water (USACE 2010a, USACE 2010b). The area may experience up to 2.32-feet of relative sea level rise (RSLR) over the next 50-years under an “intermediate “scenario. The surge buffer benefits of the swamp will continue to diminish as it degrades and disappears and sea level rises.

3. REPORT SCOPE

The scope of the risk analysis report is to calculate and present the cost and schedule contingencies at the 80 percent confidence level using the risk analysis processes as mandated by U.S. Army Corps of Engineers (USACE) Engineer Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works, ER 1110-2-1302, Civil Works Cost Engineering, and Engineer Technical Letter 1110-2-573, Construction Cost Estimating Guide for Civil Works. The report presents the contingency results for both cost and schedule risks for all project features. The study and presentation can include or exclude consideration for operation and maintenance or life cycle costs, depending upon the program or decision document intended for funding.

3.1 Project Scope

The U.S. Congress recognized the need for a hurricane and storm damage risk reduction project in the area. Two Congressional resolutions authorize this study. The first was adopted on July 29, 1971 by the U.S. House of Representatives Committee on Public Works.
“RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Lake Pontchartrain and Vicinity, Louisiana, published as House Document No. 231, 89th Congress, First Session, and other pertinent reports, with a view to determining whether modifications to the recommendations contained therein are advisable at this time, with particular reference to providing additional levees for hurricane protection and flood control in St. John the Baptist Parish and that part of St. Charles Parish west of the Bonnet Carré Spillway."

The U.S. Senate Committee on Public Works adopted a resolution on September 20, 1974.
“RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, that the Board for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Lake Pontchartrain and Vicinity, Louisiana, published as House Document No. 231, 89th Congress, First Session, and other pertinent reports, with a view to determining whether modifications to the recommendations contained therein are advisable at this time, for hurricane protection and flood control in St. James Parish."

The study was first funded in the 1980s. A 1985 Reconnaissance Report found that there was no justified structural plan suitable for Federal participation. A 1987 reconnaissance report

indicated that under Federal criteria a solution could not be found that would be economically justified or environmentally acceptable. Because of increasing population and economic activity, a 1997 reconnaissance report indicated that the study should proceed into feasibility phase. A Feasibility Cost Share Agreement was executed with the Pontchartrain Levee District (PLD) in 1998. The study stopped in 2002. Following Hurricane Katrina, renewed interest by the levee district led to an amended agreement in 2008. Planning for the project was underway when Hurricane Isaac hit in August2012. President Obama traveled to Laplace, Louisiana after the storm to view the damage and visit with residents and local leaders. The President said, **"*We're getting on the case to figure out what happened here and what we can do to make sure it won't happen again.*"** The USACE's post-Isaac damage assessment met the first part of the President's commitment. This study will help deliver the second part.

The report includes the project technical scope, feasibility level estimates developed by the engineering design firm Burk-Kleinpeter, Inc. (BKI), and the New Orleans District Cost Engineering. Construction schedules were developed by the New Orleans District Cost Engineering. New Orleans District Cost Engineering performed the Quality Control Review of BKI's work and did and internal independent review of work prepared by New Orleans District Cost Engineering. Consequently, these documents serve as the basis for the risk analysis. In general terms, the construction scope consists of the following:

- Lands and Damages
- Relocations
- Levees and Floodwalls
- Pumping Plant
- Planning, Engineering and Design
- Construction Management

3.2 USACE Risk Analysis Process

The risk analysis process follows the USACE Headquarters requirements as well as the guidance provided by the Cost Engineering Directory of Expertise for Civil Works (Cost Engineering DX). The risk analysis process reflected within the risk analysis report uses probabilistic cost and schedule risk analysis methods within the framework of the Crystal Ball software. The risk analysis results are intended to serve several functions, one being the establishment of reasonable contingencies reflective of an 80 percent confidence level to successfully accomplish the project work within that established contingency amount. Furthermore, the scope of the report includes the identification and communication of important steps, logic, key assumptions, limitations, and decisions to help ensure that risk analysis results can be appropriately interpreted.

Risk analysis results are also intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as provide tools to support decision making and risk management as the project progresses

through planning and implementation. To fully recognize its benefits, cost and schedule risk analyses should be considered as an ongoing process conducted concurrent to, and iteratively with, other important project processes such as scope and execution plan development, resource planning, procurement planning, cost estimating, budgeting, and scheduling.

In addition to broadly defined risk analysis standards and recommended practices, the risk analysis is performed to meet the requirements and recommendations of the following documents and sources:

- ER 1110-2-1150, Engineering and Design for Civil Works Projects.
- ER 1110-2-1302, Civil Works Cost Engineering.
- ETL 1110-2-573, Construction Cost Estimating Guide for Civil Works.
- Cost and Schedule Risk Analysis Process guidance prepared by the USACE Cost Engineering DX.
- Memorandum from Major General Don T. Riley (U.S. Army Director of Civil Works), dated July 3, 2007.
- Engineering and Construction Bulletin issued by James C. Dalton, P.E. (Chief, Engineering and Construction, Directorate of Civil Works), dated September 10, 2007.

4. METHODOLOGY/PROCESS

The Project Delivery Team is composed of various USACE New Orleans District branches including Project Management, Real Estate, Planning, Contracting, Structures and Levee Design, Hydrologic and Geotechnical and Cost Engineering Offices.

The District PDT conducted a February 2014 risk identification meeting, completing a draft risk register in support of a risk analysis study and modeling. Participants in the risk identification meetings included:

Miguel Ramos	USACE New Orleans	Cost Engineer
Henry Picard	A/E firm Burk Kleinpeter, Inc.	Designer & Cost Engineer
David Boyd	A/E firm Burk Kleinpeter, Inc.	Designer & Cost Engineer
Jeffery Varisco	USACE New Orleans	Project Manager
Travis Creel	USACE New Orleans	Planner
Walter Teckemeyer	USACE New Orleans	Project Engineer
Darrell Normand	USACE New Orleans	Cost Engineer

The risk analysis process for this study is intended to determine the probability of various cost outcomes and quantify the required contingency needed in the cost estimate to achieve any desired level of cost confidence. A parallel process is also used to determine the probability of various project schedule duration outcomes and quantify the required schedule contingency (float) needed in the schedule to achieve any desired level of schedule confidence.

In simple terms, contingency is an amount added to an estimate (cost or schedule) to allow for items, conditions, or events for which the occurrence or impact is uncertain and that experience suggests will likely result in additional costs being incurred or additional time being required. The amount of contingency included in project control plans depends, at least in part, on the project leadership's willingness to accept risk of project overruns. The less risk that project leadership is willing to accept the more contingency should be applied in the project control plans. The risk of overrun is expressed, in a probabilistic context, using confidence levels.

The Cost Engineering DX guidance for cost and schedule risk analysis generally focuses on the 80-percent level of confidence (P80) for cost contingency calculation. It should be noted that use of P80 as a decision criteria is a risk adverse approach (whereas the use of P50 would be a risk neutral approach, and use of levels less than 50 percent would be risk seeking). Thus, a P80 confidence level results in greater contingency as compared to a P50 confidence level.

The risk analysis process uses *Monte Carlo* techniques to determine probabilities and contingency. The *Monte Carlo* techniques are facilitated computationally by a commercially available risk analysis software package (Crystal Ball) that is an add-in to Microsoft Excel. Cost estimates are packaged into an Excel format and used directly for cost risk analysis purposes. Because Crystal Ball is an Excel add-in, the schedules for each option are recreated in an Excel format from their native format. The level of detail recreated in the Excel-format schedule is sufficient for risk analysis purposes that reflect the established risk register, but generally less than that of the native format.

The primary steps, in functional terms, of the risk analysis process are described in the following subsections. Risk analysis results would be provided in section 6.

4.1 Identify and Assess Risk Factors

Identifying the risk factors via the PDT are considered a qualitative process that results in establishing a risk register that serves as the document for the further study using the Crystal Ball risk software. Risk factors are events and conditions that may influence or drive uncertainty in project performance. They may be inherent characteristics or conditions of the project or external influences, events, or conditions such as weather or economic conditions. Risk factors may have either favorable or unfavorable impacts on project cost and schedule.

Checklists or historical databases of common risk factors are sometimes used to facilitate risk factor identification. However, key risk factors are often unique to a project and not readily derivable from historical information. Therefore, input from the entire PDT is obtained using creative processes such as brainstorming or other facilitated risk assessment meetings. In practice, a combination of professional judgment from the PDT and empirical data from similar projects is desirable and is considered.

A formal PDT meeting was held Feb 24, 2014 at the New Orleans District for the purposes of identifying and assessing risk factors. The meeting included qualified representatives from multiple project team disciplines and functions, for example:

- Project/program managers.
- Planners
- Project Engineers
- Geotechnical Engineers
- Structural Engineers
- Relocations, Real Estate, Economist, Construction (on call)
- Hydraulic Engineers
- Civil, structural, geotechnical, and hydraulic design.
- Cost and schedule engineers.

The initial meeting focused primarily on risk factor identification using brainstorming techniques, but also included some facilitated discussions based on risk factors common to projects of similar scope and geographic location. Subsequent meetings and phone conversations focused primarily on risk factor assessment and quantification.

4.2 Quantify Risk Factor Impacts

The quantitative impacts of risk factors on project plans are analyzed using a combination of professional judgment, empirical data, and analytical techniques. Risk factor impacts are quantified using probability distributions (density functions), because risk factors are entered into the Crystal Ball software in the form of probability density functions.

Similar to the identification and assessment process, risk factor quantification involves multiple project team disciplines and functions. However, the quantification process relies more extensively on collaboration between cost engineering, designers, and risk analysis team members with lesser inputs from other functions and disciplines.

The following elements of each risk factor were discussed by the PDT to estimate the elements of each risk factor:

- Maximum possible value for the risk factor.
- Minimum possible value for the risk factor.
- Most likely value (the statistical mode), if applicable.
- Nature of the probability density function used to approximate risk factor uncertainty.
- Mathematical correlations between risk factors.
- Affected cost estimate and schedule elements.

The risk discussions focused on the various project features as presented within the USACE Civil Works Work Breakdown Structure for cost accounting purposes. It was recognized that the various features carry differing degrees of risk as related to cost,

schedule, design complexity, and design progress. The example features under study are presented in table 1:

Table 2 Work Breakdown Structure by Feature

01	LANDS AND DAMAGES
02	RELOCATIONS
11	LEVEES & FLOODWALLS
13	PUMPING PLANT
30	PLANNING, ENGINEERING & DESIGN
31	CONSTRUCTION MANAGEMENT

The resulting product from the PDT discussions is captured within a risk register as presented in section 6 for both cost and schedule risk concerns. Note that the risk register records the PDT's risk concerns, discussions related to those concerns, and potential impacts to the current cost and schedule estimates. The concerns and discussions are meant to support the team's decisions related to event likelihood, impact, and the resulting risk levels for each risk event.

4.3 Analyze Cost Estimate and Schedule Contingency

Contingency is analyzed using the Crystal Ball software, an add-in to the Microsoft Excel format of the cost estimate and schedule. *Monte Carlo* simulations are performed by applying the risk factors (quantified as probability density functions) to the appropriate estimated cost and schedule elements identified by the PDT. Contingencies are calculated by applying only the moderate and high level risks identified for each option (i.e., low-level risks are typically not considered, but remain within the risk register to serve historical purposes as well as support follow-on risk studies as the project and risks evolve).

For the cost estimate, the contingency is calculated as the difference between the P80 cost forecast and the base cost estimate. Each option-specific contingency is then allocated on a civil works feature level based on the dollar-weighted relative risk of each feature as quantified by *Monte Carlo* simulation. Standard deviation is used as the feature-specific measure of risk for contingency allocation purposes. This approach results in a relatively larger portion of all the project feature cost contingency being allocated to features with relatively higher estimated cost uncertainty.

For schedule contingency analysis, the option schedule contingency is calculated as the difference between the P80 option duration forecast and the base schedule duration. These contingencies are then used to calculate the time value of money impact of project delays that are included in the presentation of total cost contingency in section 6. The resulting time value of money, or added risk escalation, is then added into the contingency amount to reflect the USACE standard for presenting the "total project cost" for the fully funded project amount.

Schedule contingency is analyzed only on the basis of each option and not allocated to specific tasks. Based on Cost Engineering DX guidance, only critical path and near critical path tasks are considered to be uncertain for the purposes of contingency analysis.

5. KEY ASSUMPTIONS

Key assumptions are those that are most likely to significantly affect the determinations and/or estimates of risk presented in the risk analysis. The key assumptions are important to help ensure that project leadership and other decision makers understand the steps, logic, limitations, and decisions made in the risk analysis, as well as any resultant limitations on the use of outcomes and results.

The following is an example of key assumptions for the risk analysis that could be identified by the PDT and risk analyst.

- Level of Design: The cost comparisons and risk analyses performed and reflected within this report are based upon design scope and estimates that are considered to be well developed and designed.
- Design Scope: The prescribed scope satisfies the requirements of this acquisition given that it is a re-authorization along the already approved alignment with minor adjustments.
- Operation and Maintenance: Operation and maintenance activities were not included in the cost estimate or schedules
- Contract Acquisition Strategy: Consistent with cost estimate and schedule assumptions, it is assumed that the contract acquisition strategy is predominately firm fixed price.
- Confidence Levels: The Walla Walla Cost Engineering Dx guidance generally focuses on the eighty-percent level of confidence (80%) for cost contingency calculation. For this risk analysis, the eighty-percent level of confidence (80%) was used. It should be noted that the use of 80% as a decision criteria is a moderate risk aversion approach, generally resulting in higher cost contingencies. However, the 80% level of confidence also assumes a small degree of risk that the recommended contingencies may be inadequate to completely capture actual project costs.
- Only moderate and high risk levels were applied for the purposes of the CSRA analysis.

The following list identifies the key risk analysis assumptions and limitations within the context of the Morganza to the Gulf of Mexico PAC CSRA. For each item, the context is first provided and then followed by the key assumption or limitation.

- *Unknown Decisions or Decision Makers:* The CSRA was prepared using a framework to generate contingency information that is appropriate for use by State of Louisiana and USACE decision makers for scheduling, budgeting, and project control purposes. The framework may generate results that are appropriate for use by a wide variety of decision makers or stakeholders;

however, the assumed use of CSRA results is limited to scheduling, budgeting, and project control. Other uses by unknown decision makers may not be appropriate.

- *Dynamic Risks:* Risk events are dynamic, not static, and should be evaluated regularly through all phases of design, construction and O&M (if required). The CSRA is based on the identification and assessment of risks as of the date of this document. Reduced utility of current CSRA results should be assumed if the likelihood and impact of risks change over time.
- *Causal Relationships:* With the exception of risk events identified as correlated in the risk register, it is assumed that the impacts of risks are independent and that the realization of one risk does not cause the realization of another. Significant variance of the risk model results from actual project costs and schedules may be experienced if significant causal relationships exist between risks assumed to be independent.
- *Conservation of Market Pricing Risk:* The CSRA assumes that market pricing risks are not created or destroyed but can only be transferred or shared *at a price* as a result of various contract acquisition strategies. As an example, it is assumed that a contractor will add a level of contingency to a fixed price bid, relative to a cost reimbursable bid, that is reflective of the risk transferred contractually from the Government to the contractor. Other aspects of contract acquisition strategies not related to market pricing, such as the management cost of modifications or claims, are not included in this assumption. Any contract acquisition strategy that actually transfers market pricing risk to a contractor *at no cost* to the Government is not reflected in the CSRA.
- *Unknown Unknown* and *Unknowable Risks*: The Kinetin Framework describes decision-making contexts, in part, by characteristic types of uncertainty. Simple, complicated, complex and chaotic contexts within the framework are respectively associated with *known known*, *known unknown*, *unknown unknown* and *unknowable* uncertainties. The CSRA process focuses on *known known* and *known unknown* risks and is not intended to quantify the impacts of *unknown unknown* or *unknowable* risks. Significant variance of the risk model results from actual project costs and schedules may be experienced if *unknown unknowable* risks, as defined in the Cynefin Framework, are realized.

6. RISK ANALYSIS RESULTS

The following sections discuss the risk register, cost risk analysis results, schedule risk analysis results, and the combined cost and schedule risk analysis results.

6.1 Risk Register

A risk register is a tool commonly used in project planning and risk analysis and serves as the basis for the risk studies and Crystal Ball risk models. A summary risk register that includes typical risk events studied (high and moderate levels) should be presented in a table in this section. The risk register reflects the results of risk factor identification

and assessment, risk factor quantification, and contingency analysis. A more detailed risk register would be provided in appendix A. The detailed risk registers of appendix A include low level and unrated risks, as well as additional information regarding the specific nature and impacts of each risk.

It is important to note that a risk register can be an effective tool for managing identified risks throughout the project life cycle. As such, it is generally recommended that risk registers be updated as the designs, cost estimates, and schedule are further refined, especially on large projects with extended schedules. Recommended uses of the risk register going forward include:

- Documenting risk mitigation strategies being pursued in response to the identified risks and their assessment in terms of probability and impact.
- Providing project sponsors, stakeholders, and leadership/management with a documented framework from which risk status can be reported in the context of project controls.
- Communicating risk management issues.
- Providing a mechanism for eliciting risk analysis feedback and project control input.
- Identifying risk transfer, elimination, or mitigation actions required for implementation of risk management plans.

6.2 Cost Risk Analysis - Cost Contingency Results

The cost risk model was run from the project Risk Register for all the project construction work. There were eight risks applicable to the project construction work. As shown in Table 2, there were a total of eight risks used in the modeling for the risk analyses which had a cost impact of moderate or high. The risk was analyzed using the low, most likely, and high estimates for each risk item and the items associated variance distribution. The analysis produced a sensitivity chart of the risk items and confidence levels from 0 to 100% and the associated contingency amount.

The cost sensitivity chart for the Project Cost is shown in Figure 3. The sensitivity chart shows the influence of each risk items on the resulting cost contingency. The risk items are ranked according to their importance to the cost contingency. As shown in the Cost Sensitivity Charts, Possible Construction Modifications and Borrow/Fill Sources Identified items had the most influence on the cost contingency.

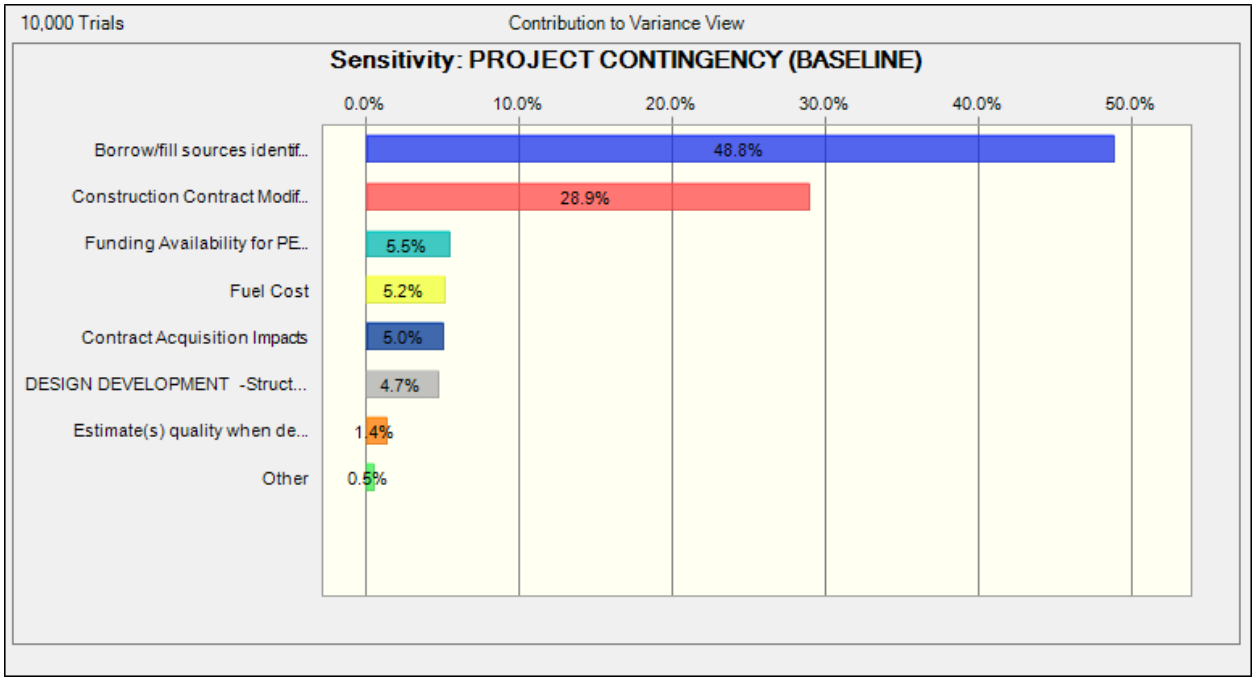


Figure 3 Project Cost Sensitivity Chart

The cost risk analysis also produced a confidence table in five percent increments of project confidence associated with contingency dollars. The confidence levels are shown in Table 3. As seen in the table, all of the associated contingency dollar amounts are positive. The contingency dollar amounts range from over $15 million to over $193 million. The recommended cost contingency amount for the project is $115,965,059.

Table 3 Project Cost Confidence Table

Confidence Level	Value	Contingency
0%	**$411,083,188**	**4.02%**
5%	**$441,601,870**	**11.74%**
10%	**$448,582,338**	**13.51%**
15%	**$453,790,781**	**14.83%**
20%	**$458,090,305**	**15.92%**
25%	**$461,725,542**	**16.84%**
30%	**$465,248,288**	**17.73%**
35%	**$468,462,654**	**18.54%**
40%	**$471,503,691**	**19.31%**
45%	**$474,341,807**	**20.03%**
50%	**$477,518,142**	**20.83%**
55%	**$480,516,261**	**21.59%**
60%	**$483,587,157**	**22.37%**
65%	**$487,146,543**	**23.27%**
70%	**$490,737,500**	**24.18%**
75%	**$494,456,374**	**25.12%**
80%	**$498,653,172**	**26.18%**
85%	**$503,477,035**	**27.40%**
90%	**$509,651,756**	**28.96%**
95%	**$519,422,304**	**31.44%**
100%	**$566,003,261**	**43.22%**

6.3 Schedule Risk Analysis - Schedule Contingency Results

A schedule risk analysis was conducted on five risks of the risk register, shown in Appendix A, which had a schedule impact of moderate or high. The project Risk Register originally considered over 40 risk items but only 5 risks were determined to have an impact on the overall program schedule. The risk was analyzed using the low, most likely, and high estimates for each risk item and the items associated variance distribution. The analysis produced a sensitivity chart of the risk items and confidence levels from 0 to 100% and the associated contingency amount.

The schedule sensitivity chart is shown in Figure 4 below. The sensitivity chart shows the influence of each risk items on the resulting schedule contingency. The risk items are ranked according to their importance to the schedule contingency. As shown in the Schedule Sensitivity Chart, the Numerous Separate Contracts (CA-2) item had the most influence on the schedule contingency. It is important to note again that the schedule is for a Program rather than a Single Project and therefore very few items were considered to be a High risk to the program and did not significantly affect the overall schedule.

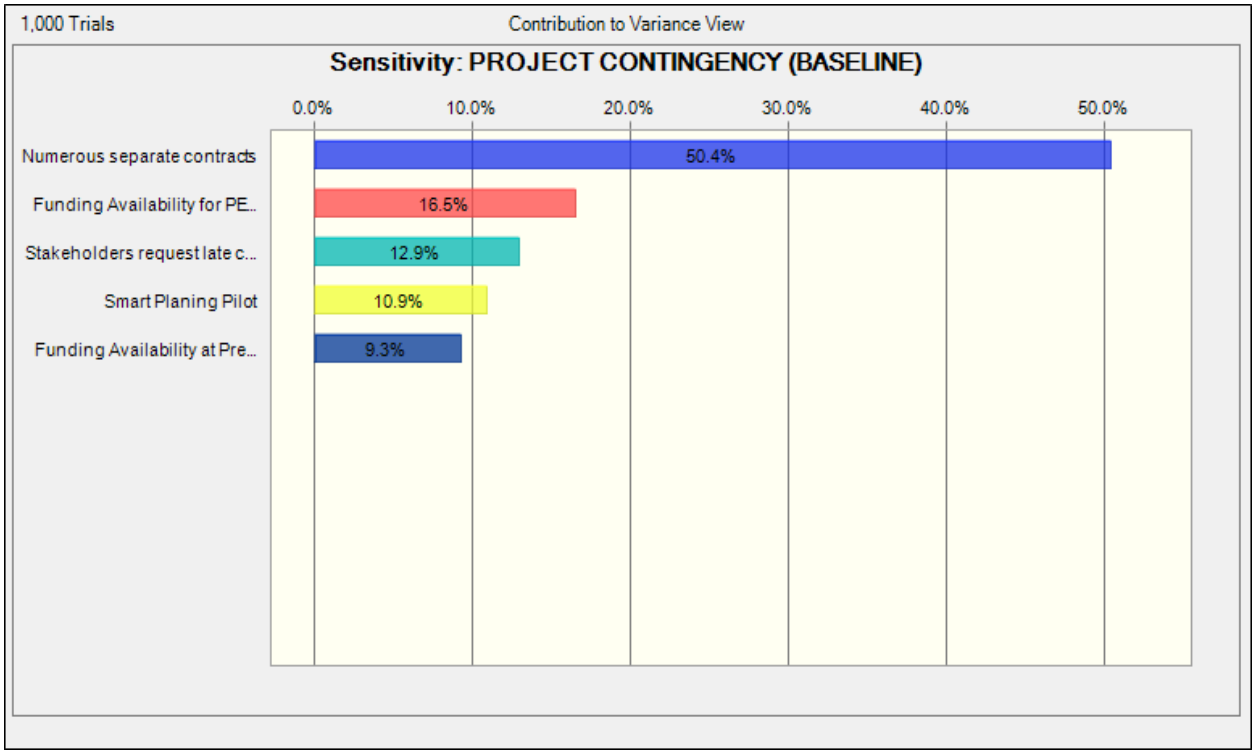


Figure 4 Project Schedule Sensitivity Chart

The schedule risk analysis also produced a confidence table in five percent increments of project confidence associated with contingency months. The confidence table is shown in Table 4 below. As seen in the table, all the associated contingency month amounts are positive. The contingency month amounts range from 4.1 months to over 56 months. The recommended schedule contingency amount is 30.5 months. Note that these results reflect only those contingencies established from the schedule risk analysis.

Confidence Level	Value	Contingency
0%	**4.1 Months**	**0.74%**
5%	**11.5 Months**	**2.07%**
10%	**13.8 Months**	**2.48%**
15%	**15.5 Months**	**2.79%**
20%	**17.2 Months**	**3.09%**
25%	**18.3 Months**	**3.28%**
30%	**19.2 Months**	**3.45%**
35%	**20.4 Months**	**3.66%**
40%	**21.3 Months**	**3.83%**
45%	**22.3 Months**	**4.00%**
50%	**23.5 Months**	**4.22%**
55%	**24.3 Months**	**4.36%**
60%	**25.5 Months**	**4.57%**
65%	**26.7 Months**	**4.79%**
70%	**27.9 Months**	**5.02%**
75%	**29.0 Months**	**5.20%**
80%	**30.5 Months**	**5.48%**
85%	**32.3 Months**	**5.79%**
90%	**34.2 Months**	**6.13%**
95%	**36.7 Months**	**6.59%**
100%	**56.1 Months**	**10.06%**

Table 4 Project Schedule Confidence Table

6.4 Combined Cost and Schedule Contingency Results

To obtain an overall feature contingency, the cost risk analysis confidence table and the schedule risk analysis confidence table are combined. That combined table is shown in Table 8. To obtain the final contingency dollar amount, the schedule contingency is converted into dollars by using the time value of money.

Confidence Level	Contingency	Contingency
0%	**$15,893,329**	**4.1 Months**
5%	**$51,126,450**	**11.5 Months**
10%	**$59,042,361**	**13.8 Months**
15%	**$64,958,788**	**15.5 Months**
20%	**$69,935,351**	**17.2 Months**
25%	**$74,017,034**	**18.3 Months**
30%	**$77,931,608**	**19.2 Months**
35%	**$81,613,631**	**20.4 Months**
40%	**$85,047,490**	**21.3 Months**
45%	**$88,271,729**	**22.3 Months**
50%	**$91,939,953**	**23.5 Months**
55%	**$95,274,616**	**24.3 Months**
60%	**$98,825,250**	**25.5 Months**
65%	**$102,881,524**	**26.7 Months**
70%	**$106,983,530**	**27.9 Months**
75%	**$111,126,364**	**29.0 Months**
80%	**$115,965,059**	**30.5 Months**
85%	**$121,487,874**	**32.3 Months**
90%	**$128,442,416**	**34.2 Months**
95%	**$139,262,068**	**36.7 Months**
100%	**$193,756,345**	**56.1 Months**

Table 5 Combined Confidence Table

7. MAJOR FINDINGS/OBSERVATIONS

The cost and schedule risk analysis resulted in a recommended combined cost contingency of $115,043,125 and a schedule recommended contingency of 30.5 months. The project construction costs for confidence levels 0 to 100% are shown below. Table 6 presents construction costs, which include base cost plus cost and schedule contingencies. Lands and Damages cost and contingency are not included. Figure 5 illustrates the construction cost risk analysis confidence curve. The recommended contingency is 31% based on the 80% confidence level. These contingencies were applied to the detailed estimate for the recommended plan for the West Shore Lake Pontchartrain project. The rounded contingency percentage of 31.0% was transferred to the TPCS for final calculation of Total Contingency and Total Cost. Lands and Damages cost and contingency are not included in the above numbers. Note: The rounding of contingencies causes the totals on the TPCS to be slightly higher than and not add up to exactly the costs above.

Table 6 Project Contingencies

Confidence Level	Project Cost	Contingency ($)	Contingency (%)
0%	**$397,563,680**	**$16,222,611**	**4.25%**
5%	**$432,186,618**	**$50,845,549**	**13.33%**
10%	**$439,852,326**	**$58,511,257**	**15.34%**
15%	**$445,540,981**	**$64,199,911**	**16.84%**
20%	**$450,600,904**	**$69,259,834**	**18.16%**
25%	**$454,852,849**	**$73,511,780**	**19.28%**
30%	**$458,992,901**	**$77,651,832**	**20.36%**
35%	**$462,313,871**	**$80,972,802**	**21.23%**
40%	**$465,774,512**	**$84,433,442**	**22.14%**
45%	**$469,188,782**	**$87,847,712**	**23.04%**
50%	**$472,669,827**	**$91,328,758**	**23.95%**
55%	**$476,002,448**	**$94,661,379**	**24.82%**
60%	**$479,746,788**	**$98,405,719**	**25.81%**
65%	**$483,360,794**	**$102,019,724**	**26.75%**
70%	**$487,188,388**	**$105,847,318**	**27.76%**
75%	**$491,442,168**	**$110,101,099**	**28.87%**
80%	**$496,384,194**	**$115,043,125**	**30.17%**
85%	**$501,851,947**	**$120,510,877**	**31.60%**
90%	**$508,157,373**	**$126,816,303**	**33.26%**
95%	**$518,313,292**	**$136,972,223**	**35.92%**
100%	**$568,598,326**	**$187,257,256**	**49.10%**

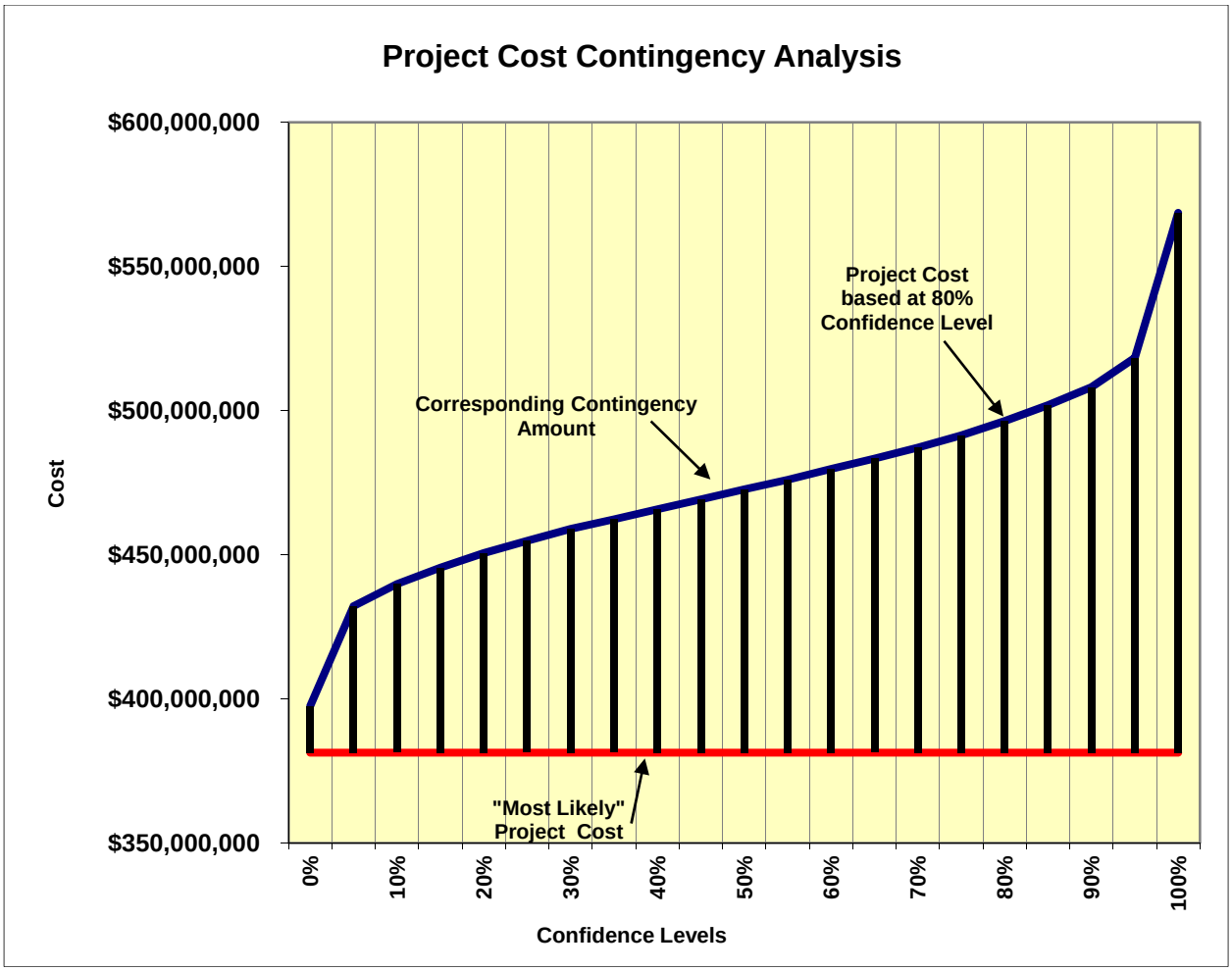


Figure 5 Sample of Project Confidence Curves

The major contributors to the resulting total project cost contingency for the project were:

- (CON-1) Construction Contract Modifications – Technical complexities and site conditions could result in increased risk of contract modifications.
- (TL-4) Borrow Sources Identified/Secured – The uncertainty of a secured borrow source for the last five lifts.
- CA-1 Contract Acquisition Impacts – Type of contracts and possible impacts to cost and schedule.
- TL-2 Design Development – Design details for the structural elements whether preliminary or detailed and their impact to costs.

- EST-1 Labor & Equipment Availability/Pricing – Variances in availability of equipment and labor throughout the project and impacts to costs.

- EST-3 Estimate quality when developed by others – Inaccuracies due to a large use of lump sums in the MII could cause changes to cost.

- PR-1 Funding Availability for PED and Construction – Impacts to costs due to funding variances causing delays and escalation of costs.

- PR-4 Fuel Cost – Fuel price variances impacts to construction costs.

The major contributor to the resulting total project contingency for the Schedule feature was:

- CA-2 Numerous Separate Contracts – Numerous separate contracts increases the risks of protests, access to projects choke points, and multiple contractor coordination.

- PPM-2 Smart Planning Pilot – Impacts to schedule due to unplanned work or requests for additional modeling/investigations under PED.

- PPM-3 Funding Availability at Pre-solicitation Stage – Impacts to schedule due to lack of funding during PED.

- PR-1 Funding Availability for PED and Construction – Impacts to schedule due to funding variances causing delays and increased costs

- PR-6 Stakeholder Request Late Changes – Additional work or alignment changes would impact costs and increase schedule delays.

These items are discussed in more detail in the Mitigation Recommendations section.

Lands and Damages are not included in the CSRA because it was not considered to be an overall program risk by the PDT. Lands and Damages is a very small project cost and any schedule delay in a specific location would not significantly affect the midpoint of the overall program. The Local Sponsor is responsible for LERRDs and in order to serve as the Non-Federal sponsor must have the authority to appropriate (take) property.

The above risk analysis results are intended to provide project leadership with risk and contingency information to support project management in scheduling, budgeting, and project control, as well as to provide tools to support decision making and risk management as projects progress through planning and implementation. These conclusions were reached by identifying and assessing risk items for use in the risk

analysis. These quantitative impacts of these risk items are then analyzed using a combination of professional judgment, empirical data, and analytical techniques.

8. MITIGATION RECOMMENDATIONS

An important outcome of the cost and schedule risk analysis is the communication of high risk areas which have a high potential to affect the project cost and/or schedule. For the West Shore Lake Pontchartrain project, the high cost risk item is the Construction Modifications and Unidentified Borrow Sources. The high Schedule Risk item is the Numerous Separate Contract for the schedule. Some of these risk items might be mitigated, reducing the risk of an increased project cost.

Construction modifications are very common and often inevitable on a project of this magnitude. No cost for modifications was included in the base cost estimate and the amount of additional cost due to modifications can be mitigated by ensuring QA/QC Guidance is followed and quality products are advertized for construction.

The borrow pit location is the Government property Bonnet Carre' Spillway at this time. Encouraging local sponsors to find suitable borrow at closest possible distance can mitigate the risk of unsecured borrow pit locations the last three lifts (years 2030, 2045, 2060).

Funding availability for PED and construction is a more uncontrollable element that may require the involvement and influence of higher level parish, state and federal elected officials to acquire necessary funding and maintain the funding integrity.

Fuel cost is a more uncontrollable element that may require the investigation of more fuel efficient construction equipment that could help offset the increases in fuel costs and availability.

SMART planning pilot impacts can be adjusted thru early discussions among the PDT, external local officials,

Numerous Separate Contracts might be mitigated by choosing certain contracting methods over other know less efficient methods. Request for Proposal method may reduce the risk of protest and awarding a contract to a contractor that may not perform well.

APPENDIX A

DETAILED RISK REGISTERS

(Present the detailed Risk Register here, covering all risk events, regardless of low, medium, or high risk concerns)

Appendix A Risk Register

Risk No.	Risk/Opportunity Event	Concerns	PDT Discussions	Project Cost		
				Likelihood*	Impact*	Risk Level*
Contract Risks (Internal Risk Items are those that are generated, caused, or controlled within the PDT's sphere of influence.)						
	PROJECT & PROGRAM MGMT					
PPM-1	Project Personnel Resources	Gov't personnel resources for project management and execution may be insufficient during peak periods of PED and Procurement.	Do not feel will be an issue. Personnel turnover and reassignments have been relatively low. Generally decreased District workload, this would be mainstay project.	Unlikely	Negligible	LOW
PPM-2	Smart Planing Pilot	First project to use new process.	We could run into unplanned work that must be accommodated. External agencies could request additional modeling/investigations under PED.	Likely	Negligible	LOW
PPM-2a	Funding Availability at Pre-solicitation stage	Lack of funding for the early stages of the project.	Lack of funding could impact the schedule and its previously set milestones.	Very Likely	Significant	HIGH

	CONTRACT ACQUISITION RISKS	-	-			
CA-1	Contract Acquisition Impacts	Unknown acquisition strategy	Acquisition startegy not yet defined. Estimate assumes typical sub-contracting. If other acquisition strategies are used on any one/or selected projects, would have minimal impact on overall project cost or schedule. Also combine with related risks from reduced competition and increased protests.	Likely	Marginal	MODERATE
CA-2	Numerous separate contracts	Protest, access to projects, multiple contractors coordinating work effort and highway traffic.	During solicitation, a protest could delay the contruction schedule. Multiple concurrent construction projects require coordination between contractors as well as impact on access roads between borrow sources and project sites.	Unlikely	Marginal	LOW
	TECHNICAL RISKS	-	-			
TL-1	ADEQUATE TECHNICAL STAFF	Gov't personnel resources for project management and execution may be insufficient during peak periods of PED and Procurement.	Do not feel will be an issue. Personnel turnover and reassignments have been relatively low. Generally decreased District workload, this would be mainstay project.	Unlikely	Marginal	LOW
TL-2	DESIGN DEVELOPMENT -Structural	What level of design? Confidence in critical qtys.	Feasibility level designs (close to 35%). Estimates are conservative. More savings may be gained through optimizing aspects of the designs, such as pile layout. Structures are typical to MVN.	Likely	Marginal	MODERATE

TL-3	DESIGN DEVELOPMENT - Geotechnical	What level of design? Confidence in critical qtys.	We have a good amount of data on 2/3 of the levee reaches. In developing the feasibility design, we used the most conservative data on the reaches where no boring/soil information was available. A 25% settlement factor has been included in the quantities. A 5% increase can be expected.	Likely	Negligible	LOW
TL-3	DESIGN DEVELOPMENT - Mechanical and electrical	What level of design? Confidence in critical qtys.	We expect minimal impact on the design. A/E has a wealth of experience on the design of Pumping Stations as well of MVN having major experience on this type of structure.	Unlikely	Marginal	LOW
TL-4	Borrow/fill sources identified / secured	Unidentified borrow sources.	Unknown borrow sources could inpact price of levee embankment of future lifts. This would include the development of new government furnished borrow pits.	Likely	Significant	HIGH
TL-5	Sufficiency/condition of borrow / fill sites	Unknown volume of available suitable material in borrow source.	Uncertainty of how much clearing and grubbing, waste of over burden, amount of processing necessary to achieve a suitable material for use as embankment. Historicaly the Corps has chosen borrow sources with a large portion of the source material as being suitable.	Unlikely	Marginal	LOW
TL-6	EMBANKMENT (Adjacent BORROW)	quality/avail of excavated material from the adjacent canal.	Top assumed unsuitable and wasted. Assumed wet and will process, included in cost and schedule. The cost and effort of achieving a suitable material from the excavated material would be too high in comparison to hauling in the material. The excavated material will be disposed as benefitialuse on the mitigation plan.This item will be removed for the refined risk register.	Likely	Negligible	LOW

	LANDS AND DAMAGES RISKS	-	-			
LD-1	Real Estate Plan	Do we have a RE plan?	Locals are acquiring much of the needed property now for the current interim work along the proposed alignment. Only considering one alignment. We already know many of the landowners. Real estate cost will be very small % of total project cost. Environmental mitigation has been identified. Mitigation included in project plan. LERDs is a Local Sponsor responsibility	Unlikely	Marginal	LOW
LD-2	Relocation Plan	Do we have a plan? Have the owners been contacted and provided input?	Cannot currently access all potential reaches in the proposed alignment. We are using 3 available databases for locating pipelinse utilities etc. There is a small degree of uncertainty because while the owners have been contacted, they have provided little information. At this point most relocation plans are assumptions. Compensability report will be included, most will be compensable. Locals are building in these areas now.	Unlikely	Marginal	LOW
LD-4	BORROW AREA	borrow area NOT indentified for haul-in material yet.	covered in FL-5	Unlikely	Marginal	LOW
	REGULATORY AND ENVIRONMENTAL RISKS	-	-			

RE-1	Impacts to High Value Habitats	Impacts to High Value Habitats (incl Essential fish habitat)	Bottom land hardwoods and forested wetlands have been accounted for under the Habitat Evaluation, mitigation plan and included in the overall project costs. Any additional impacts found would require adding a structure or modify exisiting structure.This risk item will be addressed by Planning Division.	Likely	Marginal	MODERATE
RE-2	HAZARDOUS WASTE SITE ANALYSIS	HTRW Phase I site assesment is already completed.	Avoiding all HTRW issues. Nothing in alignment triggerd Phase II investigation.	Very Unlikely	Significant	LOW
RE-3	NEPA	more NEPA required	NEPA is currently being acquired on the structural plan. Programatic EIS is being acquired for the non-structural plan. Any significant design changes will be addressed under supplemental NEPA documentation. This risk item will be addressed by Planning Division.	Likely	Marginal	MODERATE
RE-4	Cultural	potential that sites will be found.	No cultural issues have been identified.	Very Unlikely	Negligible	LOW
	CONSTRUCTION RISKS	-	-			
CON-1	Construction Contract Modifications	construction contract modifications can impact construction cost and schedule growth.	Technical complexities and site conditions could result in increased risk of contract modifications. Will impact costs, but little overall impact to larger project timeline	Very Likely	Significant	HIGH
CON-2	Alignment Revisions	Alignment revisions can impact Lands and Damages, Real Estate, Relocations, Environmental Mitigation and Utilities.	Already have borings for 2/3 of the aligment. We will be staying within the selected feasibility aligment.	Very Unlikely	Marginal	LOW

CON-3	WEATHER	impacts to project	Long overall project schedule so flexibility included. Typical conditions are already included in the schedule and costs.	Likely	Negligible	LOW
CON-4	ACCELERATED CONTRACT SCHEDULE	will jobs be rushed	currently not a time sensative project	Very Unlikely	Marginal	LOW
CON-5	Unknown Utilities	Unknown utilities may impact costs.	Investigations done with all available databases including the Louisiana Oil Spill Response Database. Locals doing work now in many areas. Impact as compared to total project cost is small.	Likely	Negligible	LOW
CON-6	Work location/condition	Marshy area.	Common South LA work condition, marsh conditions assumed in costs and schedule.	Very Likely	Negligible	LOW
CON-7	Embankment production	Assumed production rate for embankment.	Due to embankment quality, project conditions, or other factor, contractors should be able to achieve historical production on these projects. There will be variations which could impact costs. Impact to overall project schedule will be small.	Likely	Negligible	LOW
CON-8	Conflicts with other contracts		See item CA-2	Unlikely	Marginal	LOW
CON-9	Site access / restrictions (highways, bridges, dams, water, overhead / underground utilities)		See item CA-2	Very Unlikely	Marginal	LOW

CON-10	Material availability and delivery		See item TL-5	Unlikely	Marginal	LOW
	ESTIMATE AND SCHEDULE RISKS	-	-			
EST-1	LABOR & equipment AVAILABILITY/PRICING	labor shortages and increase rates	Possibility that out of state labor would be required due to labor shortage.	Unlikely	Significant	MODERATE
EST-2	MATERIAL AVAILABILITY/PRICING	material shortages and increased cost	projects are using standard mateirals, national economy is in a slump, quotes for all major materials	Unlikely	Marginal	LOW
EST-3	Estimate(s) quality when developed by others	Increased time and schedule inpact.	Possible increased time and schedule inpact due to estimmate being developed by A/E Firm and QA being performed by MVN. Inaccuracies due to large use of Lump Sum items in the MII could cause changes in the cost. BKI has vast experience in the design of pumping stations but due to the early stages of the design, details were not developed in order to capture some costs accurately.	Likely	Marginal	MODERATE
Programmatic Risks (External Risk Items are those that are generated, caused, or controlled exclusively outside the PDT's sphere of influence.)						
PR-1	Funding Availability for PED and Construction	Project is not authorized/funded. Design and construction delays could occur pending funding, resulting in increased escalation	Project is not authorized/funded. Design and construction delays could occur pending funding, resulting in increased escalation costs.	Very Likely	Significant	HIGH

		costs.				
PR-2	Bid Protest Potential	bid protests causing issues with award	See item CA-2	Likely	Negligible	LOW
PR-3	Bid Competition	low bid competition, increased cost	Good competition, not competing with HSDRRS. Lots of local contractors. - Combine in Contract acquisition risk and with Bid protest risks .	Very Unlikely	Marginal	LOW
PR-4	fuel cost	potential for escalating fuel prices	if fuel prices escalate dramatically with global recovery, could increase costs of constructing project, especially levees with much of it truck hauled	Likely	Marginal	MODERATE
PR-5	Local communities pose objections	Local communities delay project.	Locals might request to be included in the alignment. Causing delays to the schedule but should not increase the cost of the project.	Likely	Negligible	LOW
PR-6	Stakeholders request late changes	Delayed project and increased costs.	Any additional work or alignment change would result on increased costs and schedule delays.	Unlikely	Negligible	LOW

ALIGNMENT C1 – OVERALL PLAN VIEWS

Legend

- Center Line of Levee
- Toe of Levee
- Levee Servitude
- Levee
- Canal
- Borrow Servitude

3000 0 3000 6000

SCALE IN FEET

Key Plan

Tower line/Underground Utility Pipelines R.O.W.

Overhead Power lines/Underground Utility Pipelines R.O.W.

Underground Utility Pipelines R.O.W.

ST. JAMES PARISH
ST. JOHN THE BAPTIST PARISH

LA 3188

LA 3127

US 61

Garyville

Reserve

LaPlace

Lake Pontchartrain

Peavine Rd.

Frenier Rd.

Montz Canal

Old Hammond Ditch

Woodland Canal

River Forest Canal

Mississippi River

Bonnet Carre Spillway

Hope Canal

Mississippi Bayou

Reserve Relief Canal

LaPlace Plantation Canal

Pertuis Canal

Red Gully Canal

Tebo Canal

L'Ansair Canal

Pontchartrain Canal

PRESCOTT CANAL
PRESCOTT ROAD

Upper Guide Levee

ACCESS ROAD

STAGING AREA

ST. JOHN THE BAPTIST PARISH
ST. CHARLES PARISH

950+00
1000+00
1050+00
900+00
850+00
800+00
750+00
700+00
650+00
600+00
550+00
500+00
450+00
400+00
350+00
300+00
250+00
200+00
150+00

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER	C1.0
PARISH	ST. CHARLES / ST. JOHN THE BAPTIST ST. JAMES / ASCENSION PARISHES
PLD PROJECT	
USACE PROJECT	

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE CLASS: Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP	DATE	03/2014
CHECKED	HMP	SHEET	1 OF 45
DETAILED	GAD		
CHECKED	DEB/TNP		

NO.	DATE	REVISION DESCRIPTION	BY

Legend

- Center Line of Levee
- Toe of Levee
- Levee Servitude
- Levee
- Borrow Canal
- Borrow Servitude

400 0 400 800
SCALE IN FEET

Key Plan

I-10
MATCHLINE STA. 240+00
236+00.00
235+00
231+44.11
230+00
228+33.14
225+00
220+00
215+00
210+00
200+00
195+00
190+00
185+00
180+00
178+00.00
175+00
170+00
165+00
160+00
155+00
150+00
145+00
140+00
135+00
130+00
129+17.02
125+00
120+00
115+00
110+00
105+00
100+00
PROPOSED WALL (UNDER INTERSTATE)
PROPOSED LEVEE
PROPOSED CANAL
SECT C-3
SECT C-2
SECT C-1
ST. JOHN THE BAPTIST PARISH
ST. CHARLES PARISH
ENTERGY ROAD
PRESCOTT CANAL
Underground Utility Pipelines R.O.W.
STAGING AREA
ACCESS ROAD
Overhead Power lines R.O.W.
ENTERGY RD. OVER CANAL AND LEVEE (BRIDGE AND RAMP)

SHEET NUMBER C1.1

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES
PLD PROJECT
USACE PROJECT

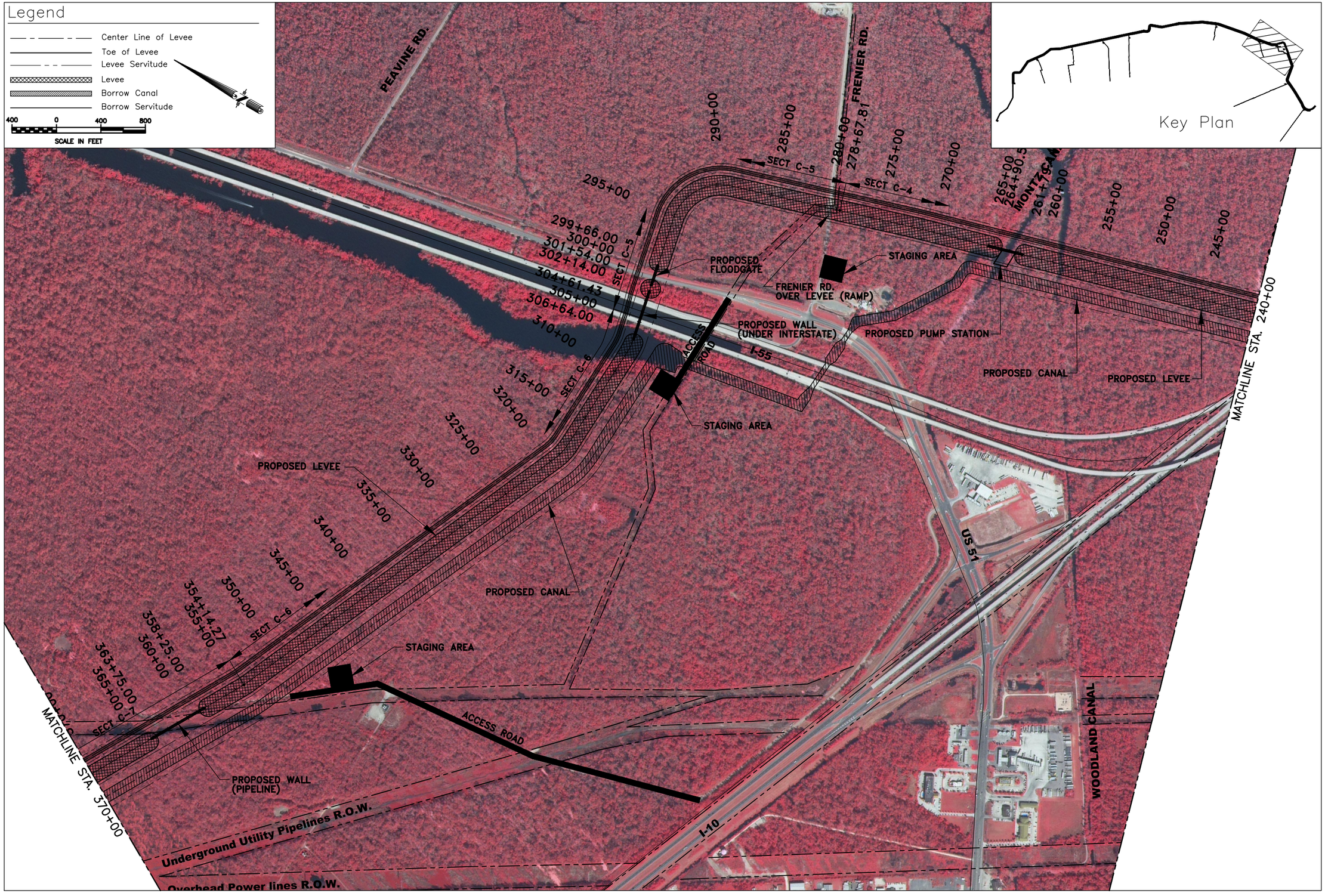
WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION
LEVEE CLASS: Alignment C

BKI
MA GSA

DESIGNED	D.E.B./T.N.P.
CHECKED	H.M.P.
DETAILED	G.A.D.
CHECKED	D.E.B./T.N.P.
DATE	03/2014
SHEET	2 of 21

NO.	DATE	REVISION DESCRIPTION	BY

XREF: XREFNAME
DATE: PLOTDATE
FILE NAME: FILENAME



XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C1.2

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PLD PROJECT

USACE PROJECT

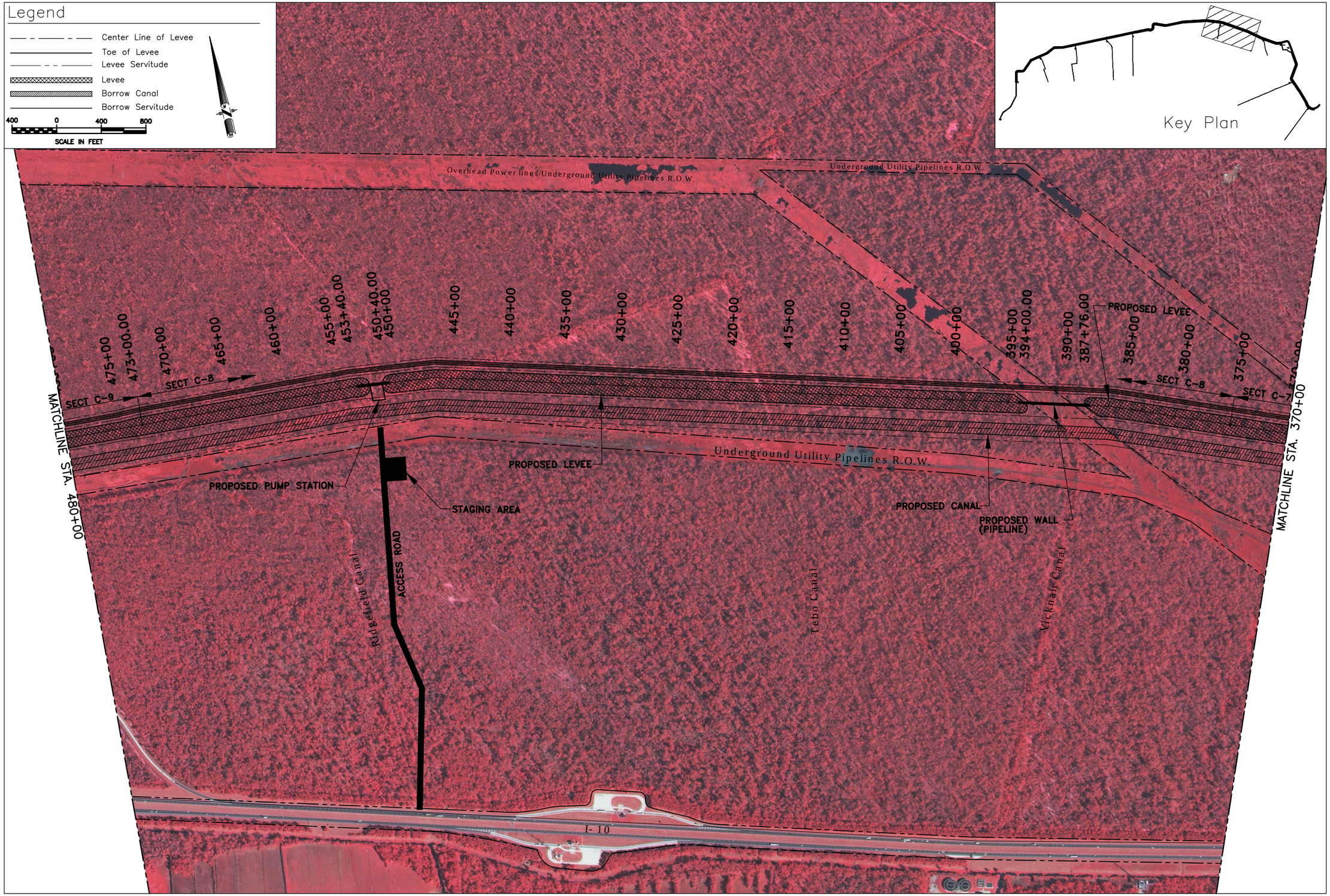
WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE CLASS: Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	GAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	3 OF 45

NO.	DATE	REVISION DESCRIPTION	BY



XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C1.3

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST ST. JAMES / ASCENSION PARISHES

PLD PROJECT

USACE PROJECT

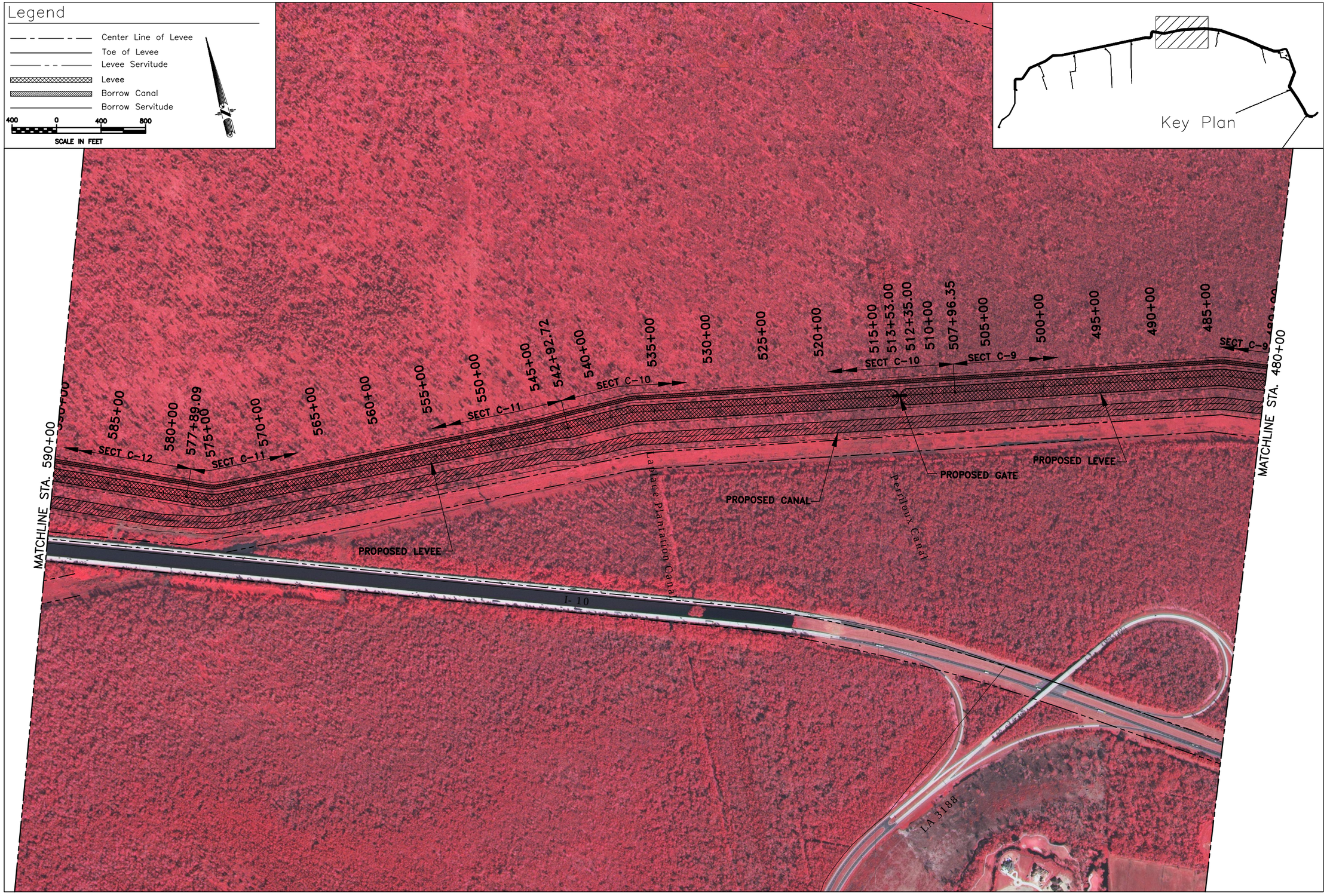
WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE CLASS: Alignment C

BKI
MA GSA

DESIGNED / CHECKED	DEB/TNP HMP
DETAILED / CHECKED	GAD DEB/TNP
DATE / SHEET	03/2014 4 OF 45

NO.	DATE	REVISION DESCRIPTION	BY



XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER	C1.4
PARISH	ST. CHARLES / ST. JOHN THE BAPTIST ST. JAMES / ASCENSION PARISHES
PLD PROJECT	
USACE PROJECT	

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE CLASS: Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP	DATE	03/2014
CHECKED	HMP	SHEET	5 OF 45
DETAILED	GAD		
CHECKED	DEB/TNP		

NO.	DATE	REVISION DESCRIPTION	BY

Legend

- Center Line of Levee
- Toe of Levee
- Levee Servitude
- Levee
- Borrow Canal
- Borrow Servitude

400 0 400 800

SCALE IN FEET

Key Plan

I- 10

MATCHLINE STA. 590+00

600+00

595+00

605+00

607+16.68

610+00

SECT C-12

625+00

612+85.46

SECT C-13

630+00

635+00

640+00

645+00

650+00

653+16.92

655+00

659+00

660+00

663+16.55

665+00

670+00

675+00

680+00

681+62.66

685+00

690+00

695+00

700+00

705+00

MATCHLINE STA. 705+00

SECT C-13

SECT C-14

SECT C-15

PROPOSED FLOODWALL (UNDER INTERSTATE)

PROPOSED LEVEE

PROPOSED CANAL

PROPOSED PUMP STATION AND WALL (PIPELINE)

STAGING AREA

ACCESS ROAD

Reserve Relief Canal

PROPOSED CANAL

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C1.5

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST ST. JAMES / ASCENSION PARISHES

PLD PROJECT

USACE PROJECT

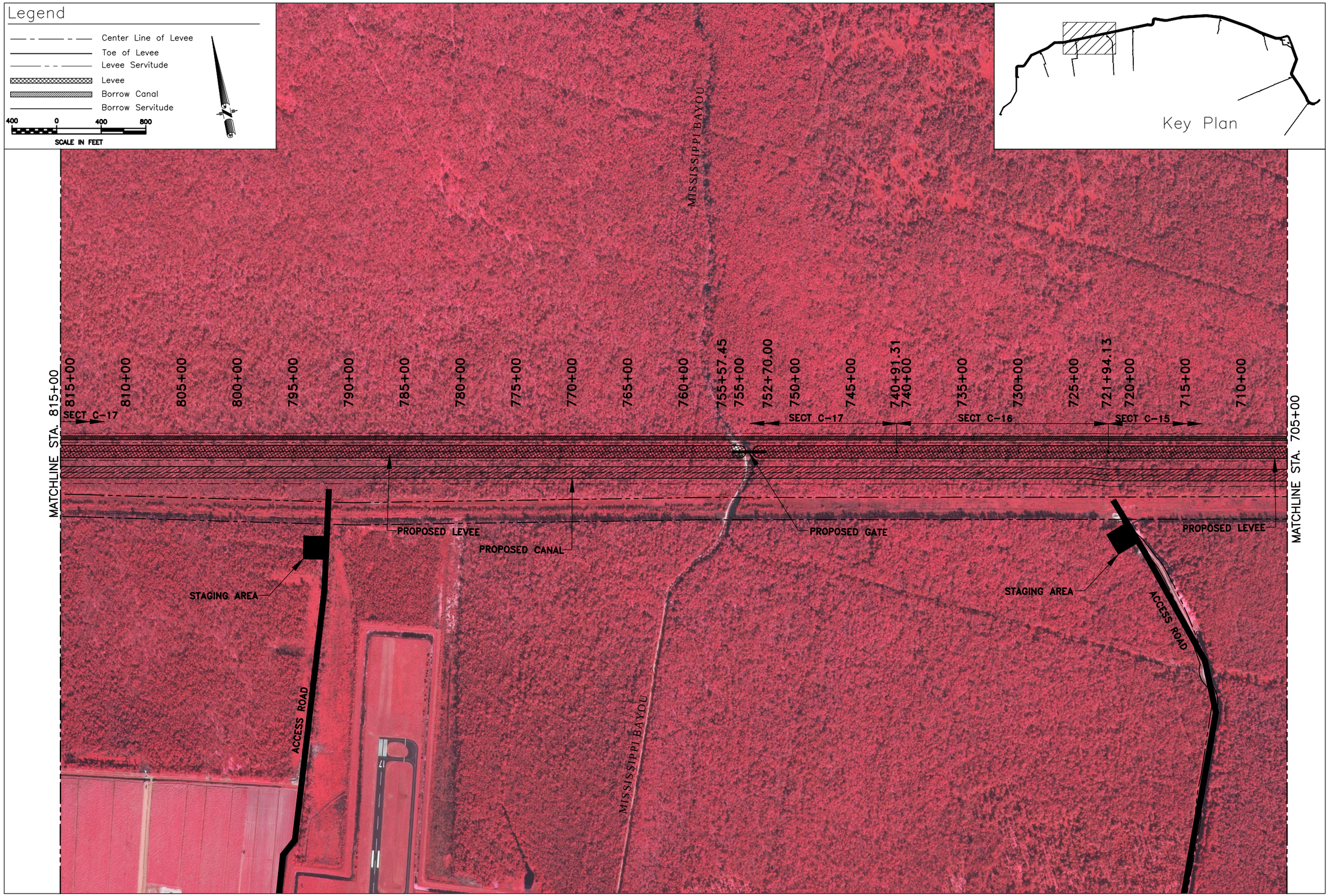
WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE CLASS: Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP	DATE	03/2014
CHECKED	HMP	SHEET	6 OF 45
DETAILED	GAD		
CHECKED	DEB/TNP		

NO.	DATE	REVISION DESCRIPTION	BY



XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C1.6

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PLD PROJECT

USACE PROJECT

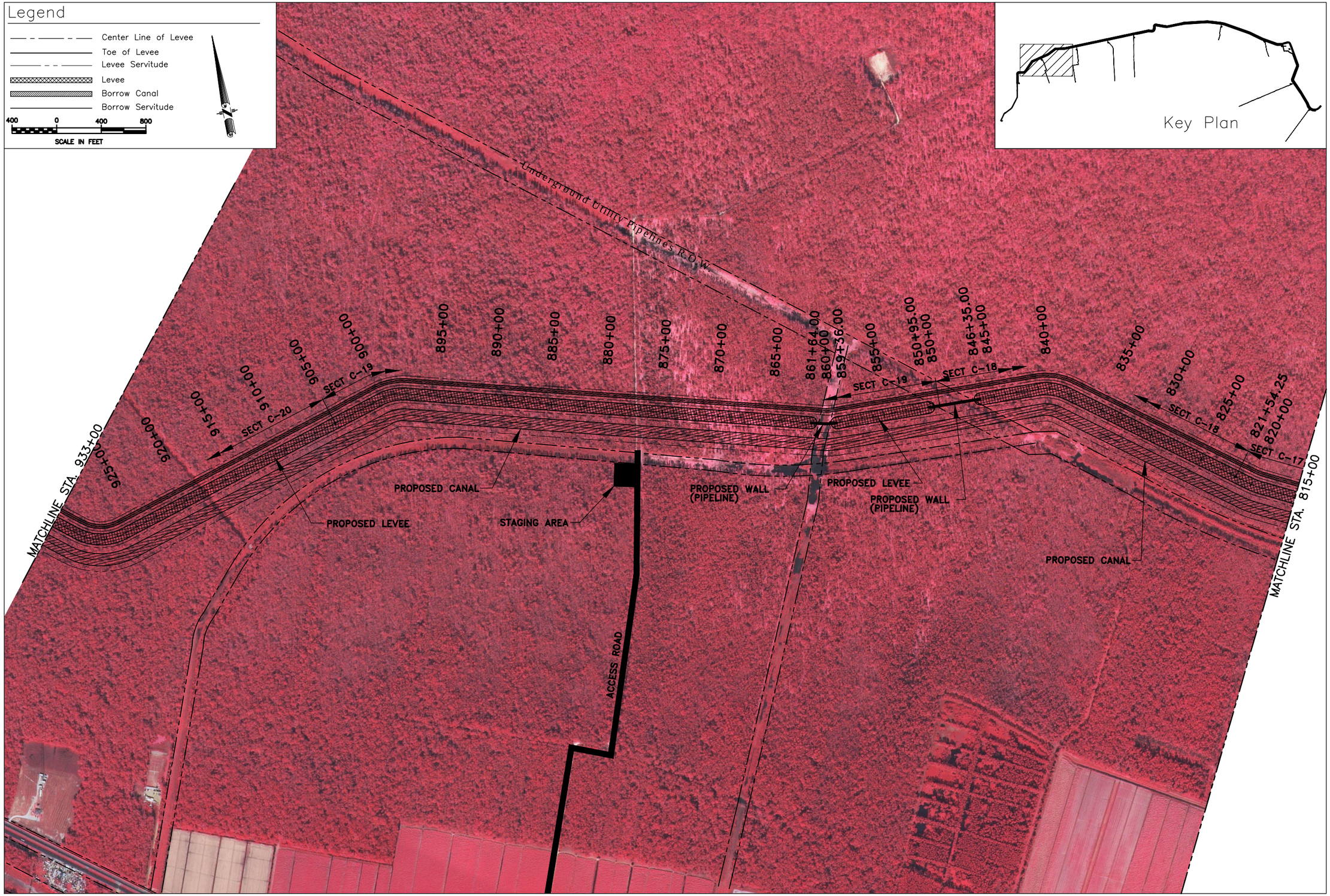
WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE CLASS: Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	GAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	7 OF 45

NO.	DATE	REVISION DESCRIPTION	BY



XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C1.7

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PLD PROJECT

USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE CLASS: Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	GAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	8 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

- Center Line of Levee
- Toe of Levee
- Levee Servitude
- Levee
- Borrow Canal
- Borrow Servitude

400 0 400 800
SCALE IN FEET

Key Plan

1063+00
1060+00
1055+00
1050+00
SECT C-22
STAGING AREA
1045+74.47
1045+00
1044+21.30
1040+00
1035+00
PROPOSED FLOODGATE (RAILROAD)
PROPOSED LEVEE
1030+00
1025+00
1020+00
1015+00
1010+00
1005+00
1000+00
995+00
990+00
985+05.69
985+00
983+55.67
980+00
975+00
970+00
967+91.21
965+00
960+00
955+00
950+00
945+00
SECT C-22
SECT C-21
SECT C-20
940+00
937+57
935+00
934+82
PROPOSED FLOODGATE (RAILROAD)
AIRLINE HWY. OVER LEVEE (RAMP)
PROPOSED LEVEE
STAGING AREA
PROPOSED PUMP STATION
MATCHLINE STA. 933+00

SHEET NUMBER C1.8

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES
PLD PROJECT
USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION
LEVEE CLASS: Alignment C

BKI
MA GSA

DESIGNED	DER/TNP	DATE	03/2014
CHECKED	HMP	SHEET	9 OF 45
DETAILED	GAD		
CHECKED	DEB/TNP		

NO.	DATE	REVISION DESCRIPTION	BY

XREF: NONE
DATE:
FILE NAME: X.DWG

ALIGNMENT C2 – 1ST LIFT (Year 2020)

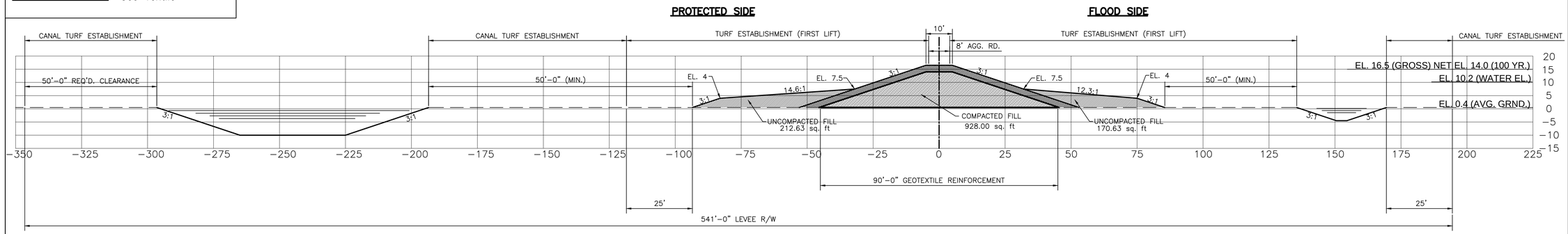
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10.0 NAVD88

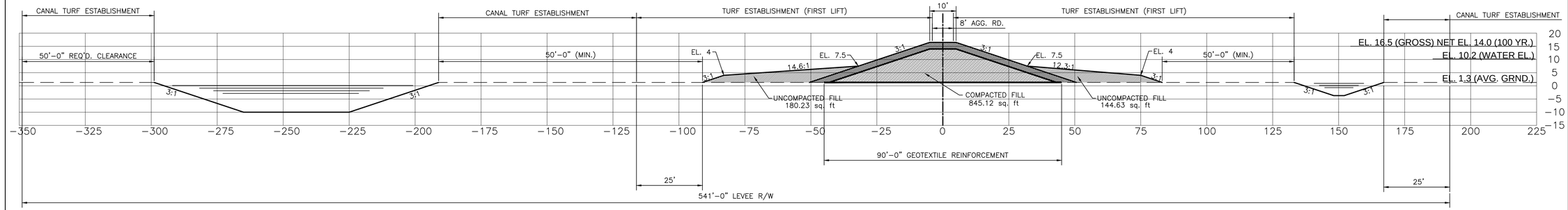
SCALE IN FEET



Levee Section C−3 (Sta. 178+00.00 thru Sta. 228+33.14)

First Lift

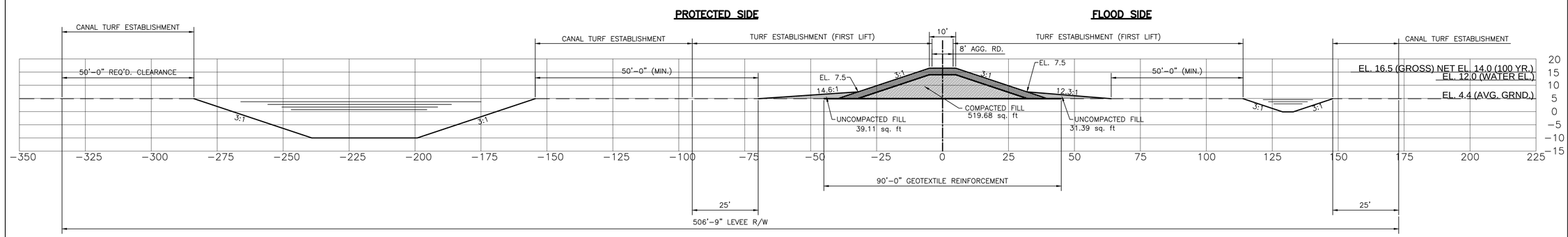
Note: See Sht. C3.0 For Second Lift Section



Levee Section C−2 (Sta. 129+17.02 thru Sta. 178+00.00)

First Lift

Note: See Sht. C3.0 For Second Lift Section



Levee Section C−1 (Sta. 100+00 thru Sta. 129+17.02)

First Lift

Note: See Sht. C3.0 For Second Lift Section

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C2.0

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION
PLD PROJECT
USACE PROJECT

LEVEE PLANS: Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	GAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	10 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

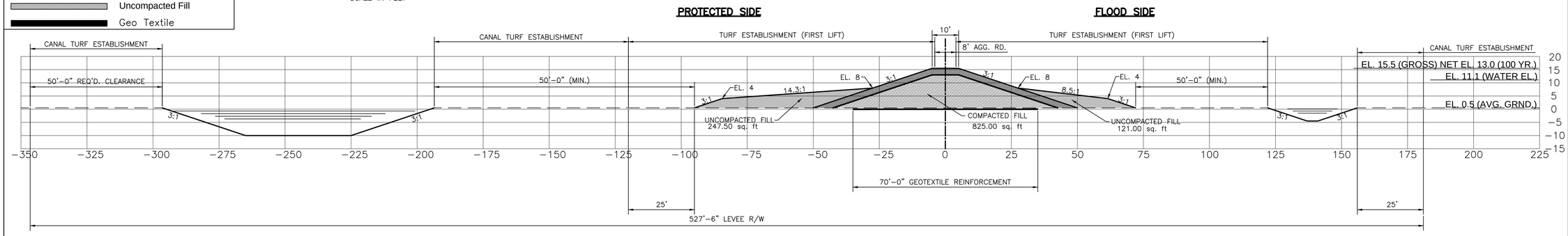
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40

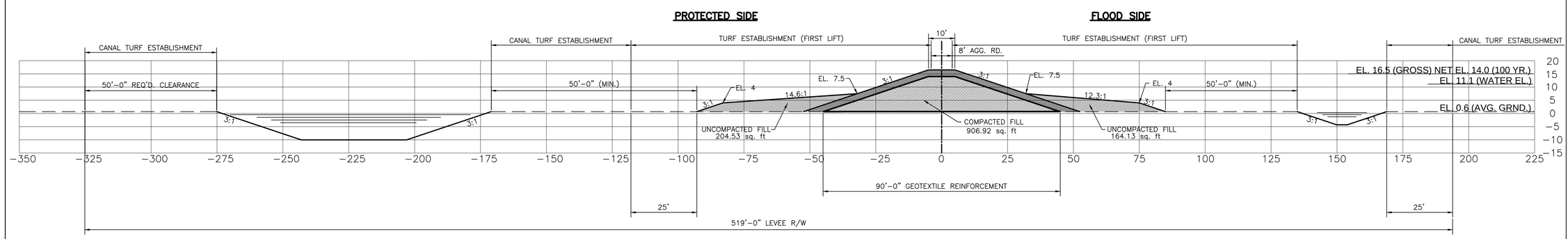
SCALE IN FEET



Levee Section C−6 (Sta. 304+61.43 thru Sta. 354+14.27)

First Lift

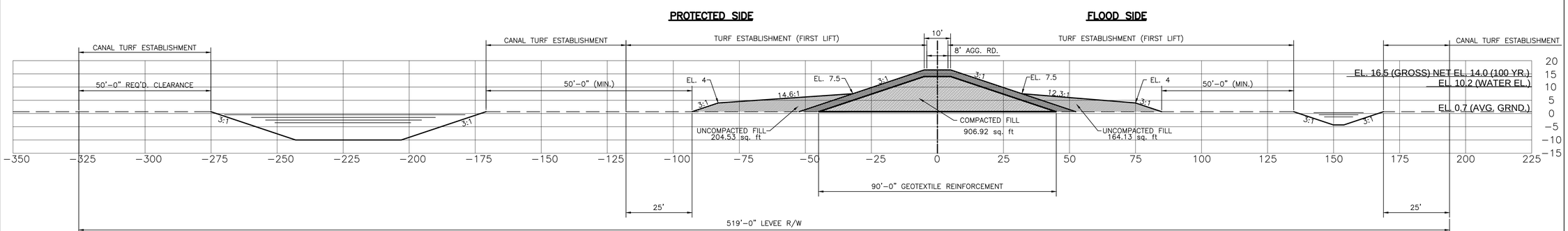
Note: See Sht. C3.1 For Second Lift Section



Levee Section C−5 (Sta. 278+67.81 thru Sta. 304+61.43)

First Lift

Note: See Sht. C3.1 For Second Lift Section



Levee Section C−4 (Sta. 228+33.14 thru Sta. 278+67.81)

First Lift

Note: See Sht. C3.1 For Second Lift Section

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C2.1

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PLD PROJECT

USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS: Alignment C

BKI
MA GSA

DESIGNED DEB/TNP
CHECKED HMP
DETAILED GAD
CHECKED DEB/TNP
DATE 03/2014
SHEET 11 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

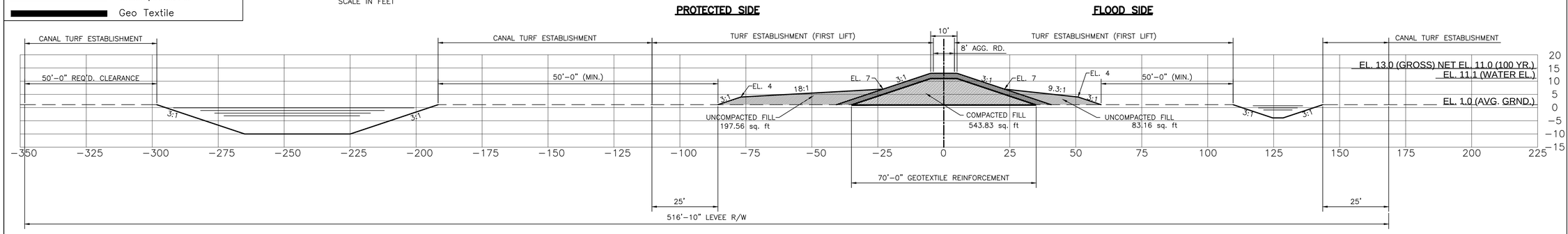
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

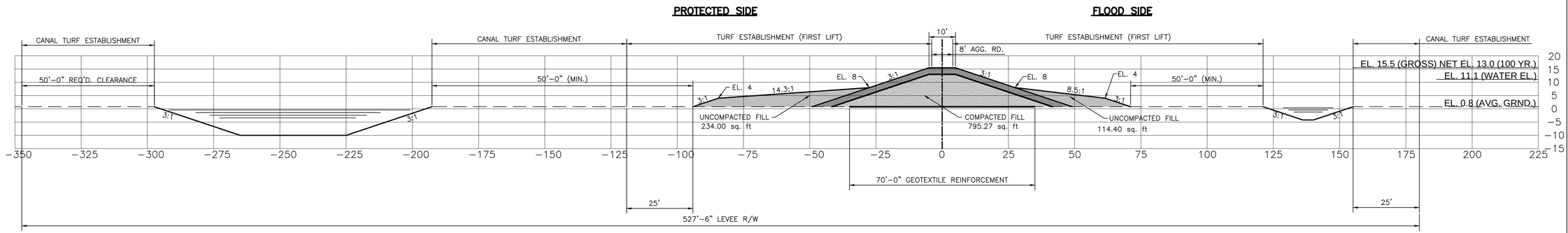
20 0 20 40
SCALE IN FEET



Levee Section C−9 (Sta. 473+00.00 thru Sta. 507+96.35)

First Lift

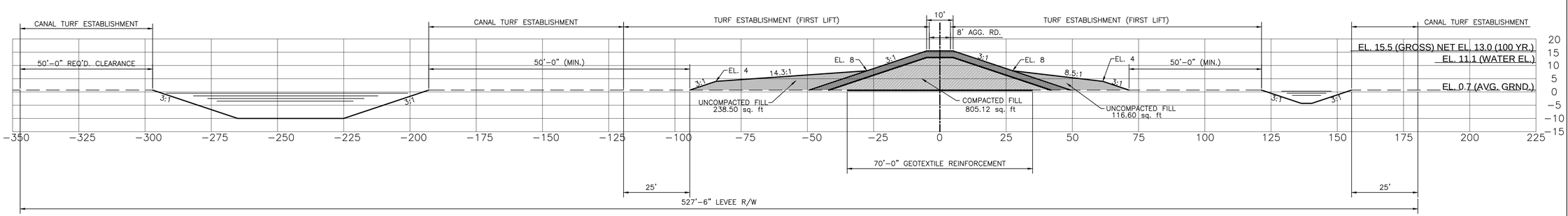
Note: See Sht. C3.2 For Second Lift Section



Levee Section C−8 (Sta. 375+00.00 thru Sta. 473+00.00)

First Lift

Note: See Sht. C3.2 For Second Lift Section



Levee Section C−7 (Sta. 354+14.27 thru Sta. 375+00.00)

First Lift

Note: See Sht. C3.2 For Second Lift Section

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C2.2

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

PARISHES | LEVEE PLANS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP	GAD	DEB/TNP	03/2014
CHECKED	HMP			
DETAILED				12 OF 45
CHECKED				
DATE				SHEET

NO.	DATE	REVISION DESCRIPTION	BY

Legend

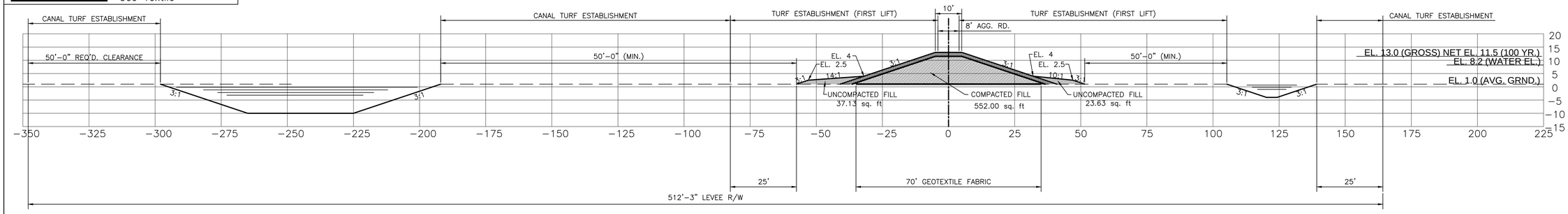
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40

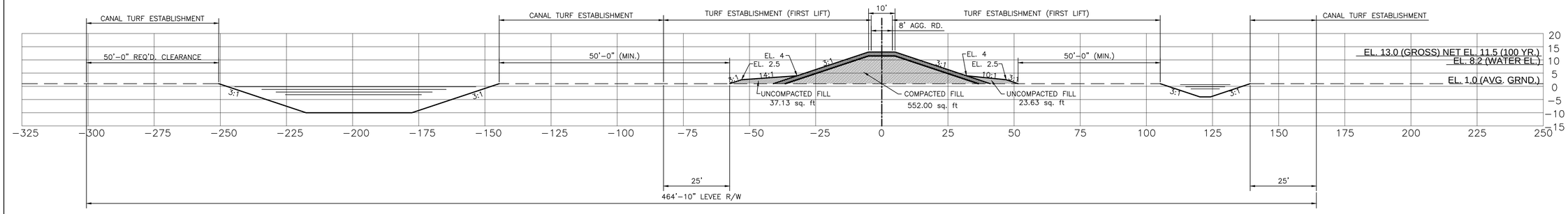
SCALE IN FEET



Levee Section C−12 (Sta. 577+89.09 thru Sta. 612+85.46)

First Lift

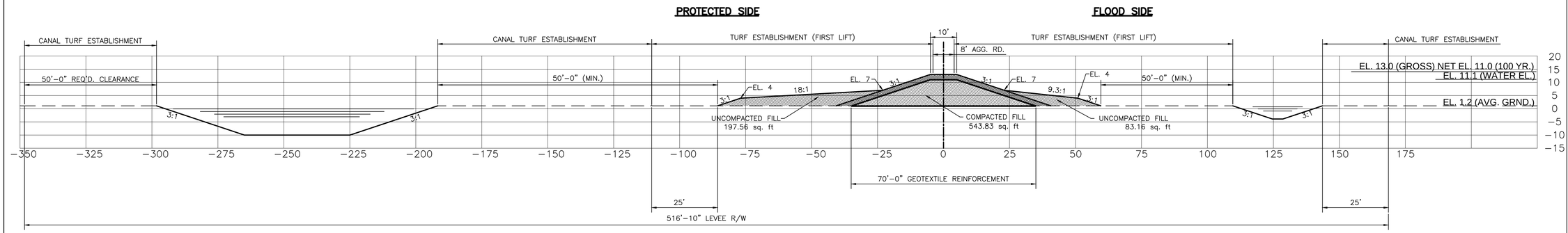
Note: No Second Lift Required



Levee Section C−11 (Sta. 542+92.72 thru Sta. 577+89.09)

First Lift

Note: No Second Lift Required



Levee Section C−10 (Sta. 507+96.35 thru Sta. 542+92.72)

First Lift

Note: See Sht. C3.3 For Second Lift Section

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C2.3

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS: Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	CAD DEB/TNP
CHECKED	
DATE	03/2014
SHEET	13 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

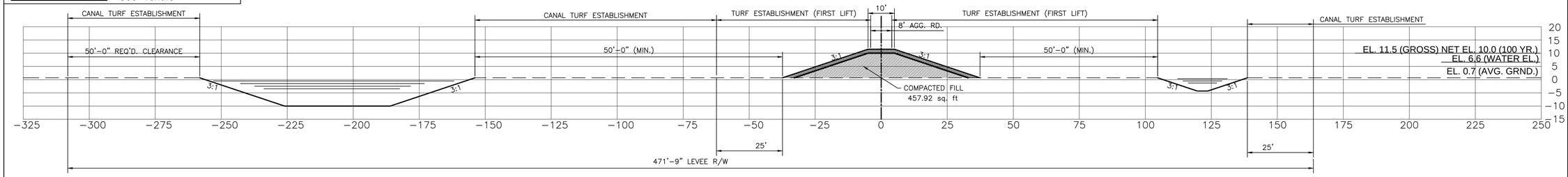
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET

PROTECTED SIDE **FLOOD SIDE**

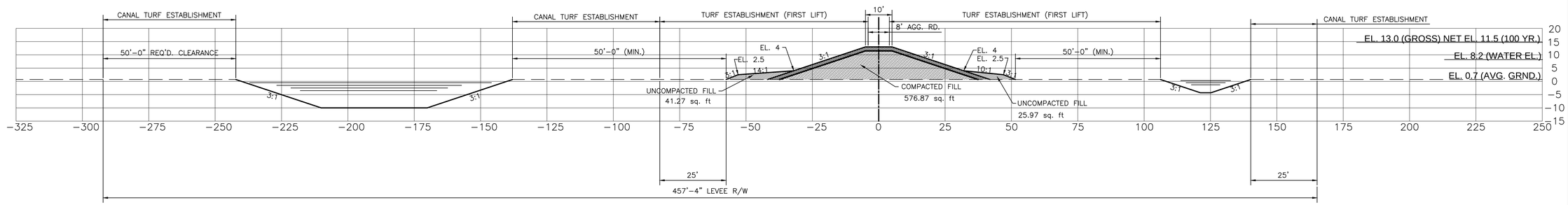


Levee Section C−15 (Sta. 681+62.66 thru Sta. 721+94.13)

First Lift

Note: No Second Lift Required

PROTECTED SIDE **FLOOD SIDE**

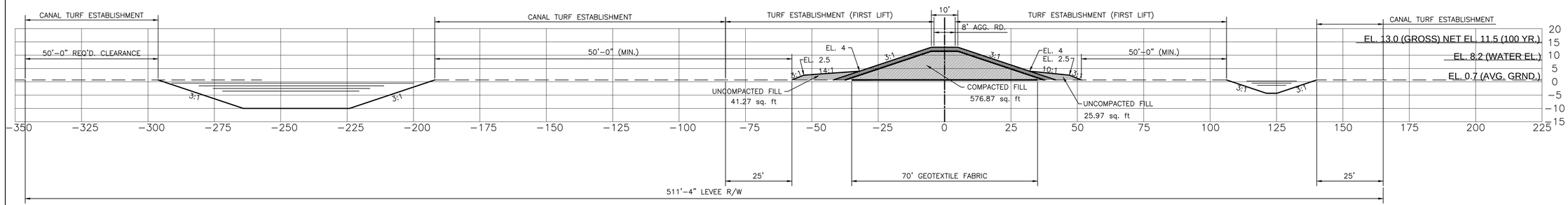


Levee Section C−14 (Sta. 653+16.92 thru Sta. 681+62.66)

First Lift

Note: No Second Lift Required

PROTECTED SIDE **FLOOD SIDE**



Levee Section C−13 (Sta. 612+85.46 thru Sta. 653+16.92)

First Lift

Note: See Sht. C3.3 For Second Lift Section

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C2.4

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE ELANS | Alignment C

BKI
MA GSA

DESIGNED CHECKED	DETAILED CHECKED	DATE SHEET
DEB/TNP HMP	GAD DEB/TNP	03/2014 14 of 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

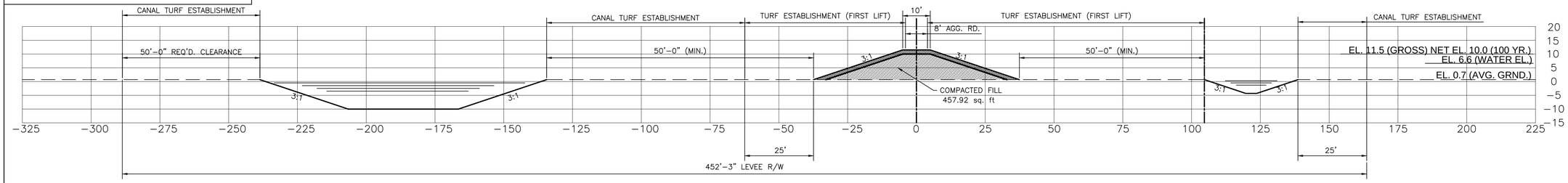
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET

PROTECTED SIDE **FLOOD SIDE**

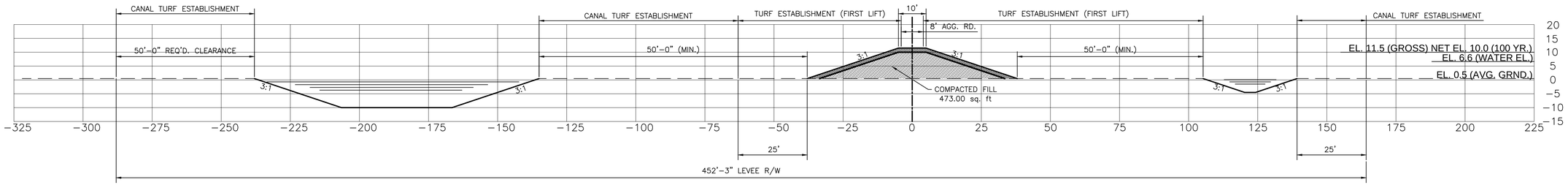


Levee Section C−18 (Sta. 821+54.25 thru Sta. 850+00.00)

First Lift

Note: No Second Lift Required

PROTECTED SIDE **FLOOD SIDE**

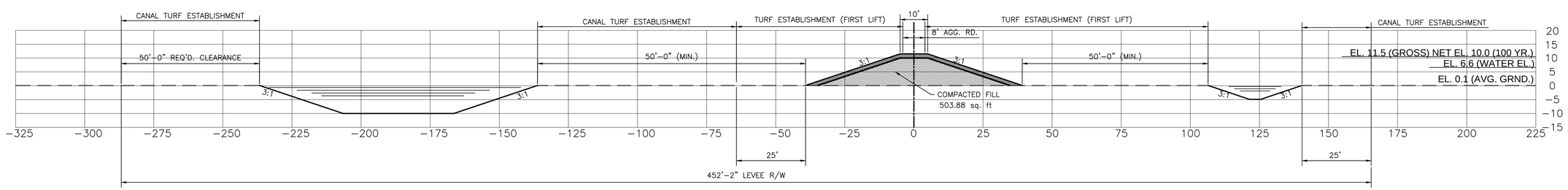


Levee Section C−17 (Sta. 740+91.43 thru Sta. 821+54.25)

First Lift

Note: No Second Lift Required

PROTECTED SIDE **FLOOD SIDE**



Levee Section C−16 (Sta. 721+94.13 thru Sta. 740+91.31)

First Lift

Note: No Second Lift Required

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C2.5

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

SOUTHEAST LOUISIANA FLOOD PROTECTION AUTHORITY-EAST

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE FLANS | Alignment C

STATE OF LOUISIANA

BKI
MA GSA

DESIGNED	DEB/TNP HMP
DETAILED	CAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	15 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

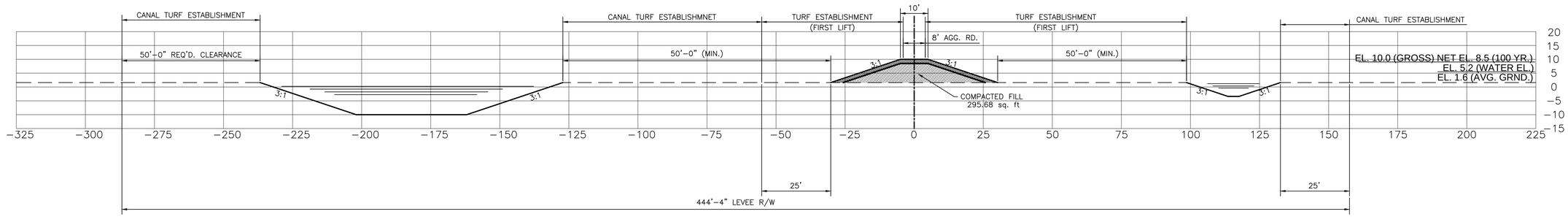
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET

PROTECTED SIDE **FLOOD SIDE**

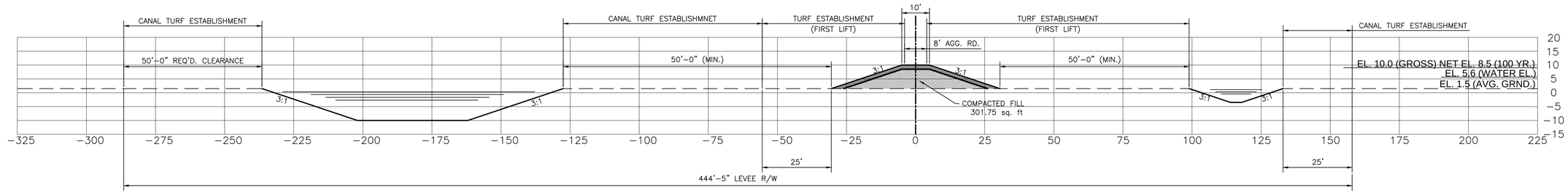


Levee Section C−21 (Sta. 945+00.00 thru Sta. 967+91.21)

First Lift

Note: No Second Lift Required

PROTECTED SIDE **FLOOD SIDE**

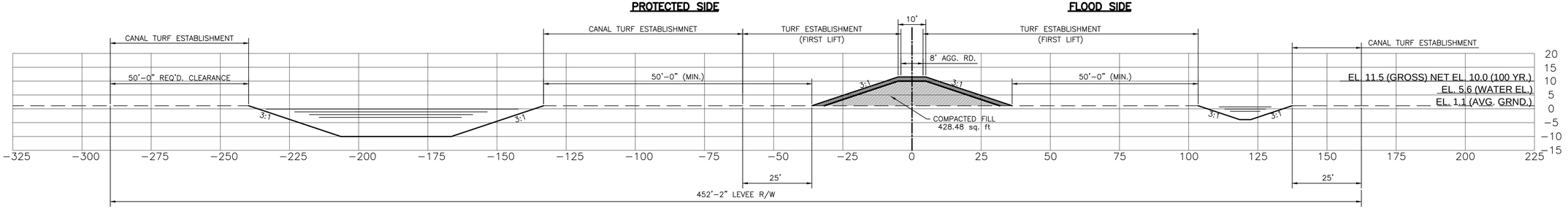


Levee Section C−20 (Sta. 905+00.00 thru Sta. 945+00.00)

First Lift

Note: No Second Lift Required

PROTECTED SIDE **FLOOD SIDE**



Levee Section C−19 (Sta. 850+00.00 thru Sta. 905+00.00)

First Lift

Note: No Second Lift Required

XREF: NONE
DATE:
FILE NAME: X.DWG

SHEET NUMBER C2.6

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE FLANS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	GAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	16 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

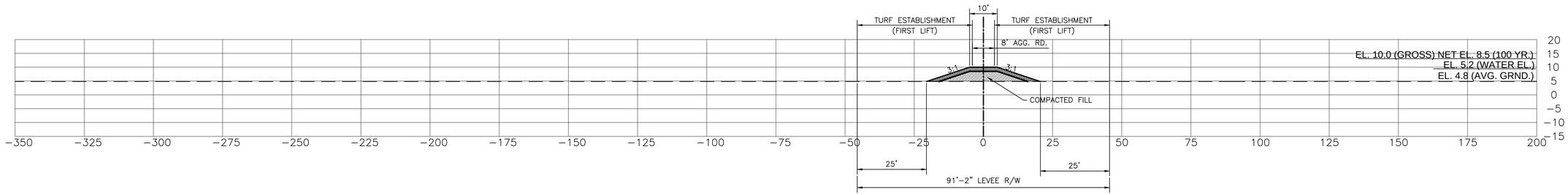
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40

SCALE IN FEET



Levee Section C−22 (Sta. 967+91.21 thru Sta. 1063+87.55)

First Lift

Note: No Second Lift Required

FILE NAME: X.DWG DATE: XREF: NONE

NO.	REVISION DESCRIPTION	BY
	D-TE	

DESIGNED DEB/TNP
CHECKED HMP
DET-ILED GAD
CHECKED DEB/TNP
D-TE 03/2014
SHEET 17 OF 45

BKI
MA GSA

WEST SHORE – L-KE PONTCH-RTR-IN, L-
HURRIC-NE PROTECTION PROJECT
P-RISHES OF ST. CH-RLES, ST. JOHN THE B-PTIST,
ST. J-MES, -ND -SCENSION

LEVEE PL-NS Alignment C

P-RISH | PLD PROJECT | US-CE PROJECT

ST. CH-RLES / ST. JOHN THE B-PTIST
ST. J-MES / -SCENSION P-RISHES

SHEET NUMBER C2.7

ALIGNMENT C3 – 2nd LIFT (Year 2020)

Legend

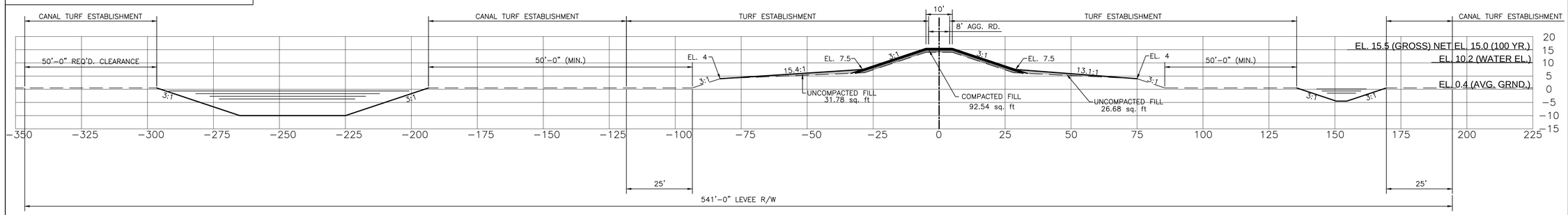
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET

PROTECTED SIDE **FLOOD SIDE**

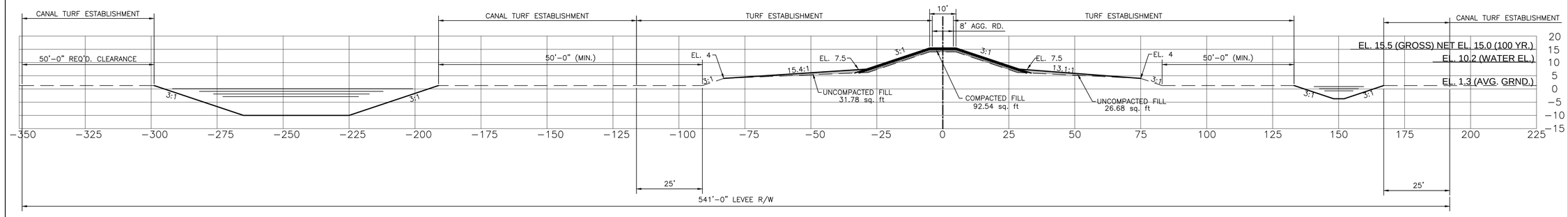


Levee Section C−3 (Sta. 178+00.00 thru Sta. 228+33.14)

First Lift

Note: See Sht. C2.0 For First Lift Section

PROTECTED SIDE **FLOOD SIDE**

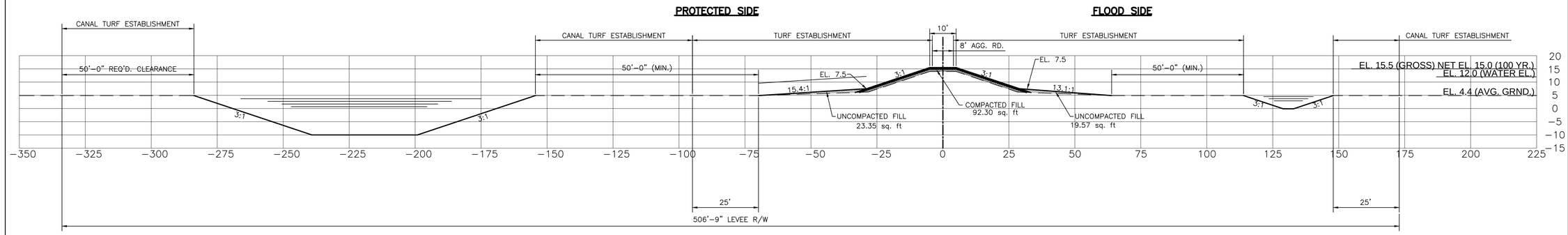


Levee Section C−2 (Sta. 129+17.02 thru Sta. 178+00.00)

First Lift

Note: See Sht. C2.0 For First Lift Section

PROTECTED SIDE **FLOOD SIDE**



Levee Section C−1 (Sta. 100+00 thru Sta. 129+17.02)

First Lift

Note: See Sht. C2.0 For First Lift Section

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C3.0

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE ELANS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP	GAD	DEB/TNP	03/2014
CHECKED	HMP			
DETAILED				18 OF 45
CHECKED				
		DATE		SHEET

NO.	DATE	REVISION DESCRIPTION	BY

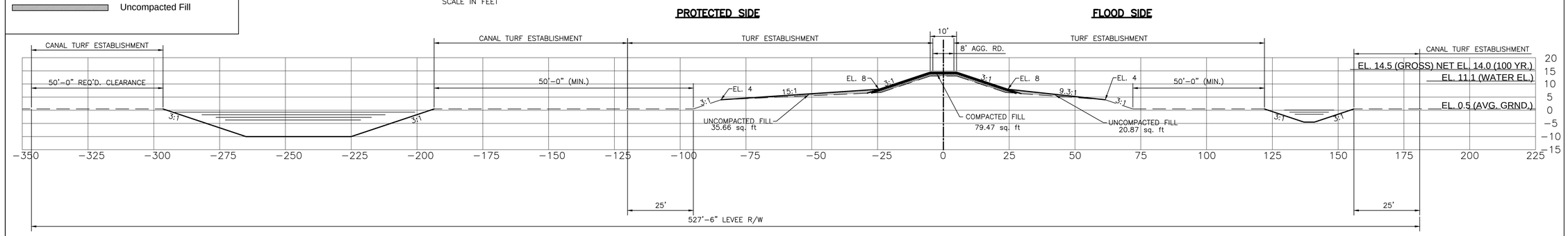
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

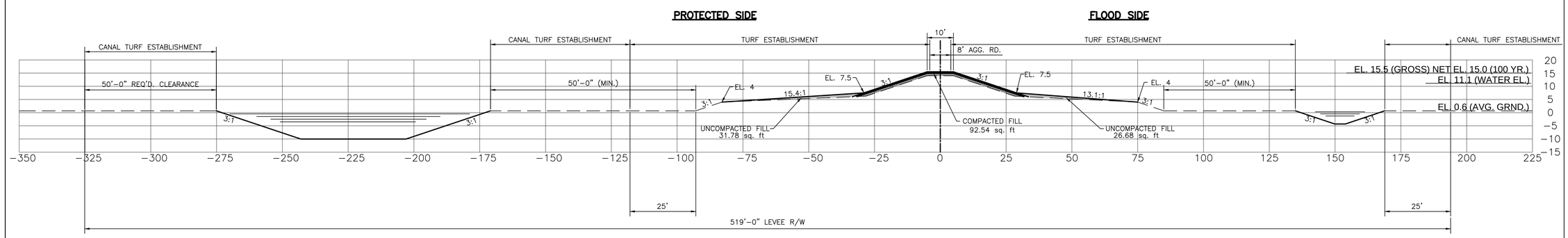
20 0 20 40
SCALE IN FEET



Levee Section C−6 (Sta. 304+61.43 thru Sta. 354+14.27)

First Lift

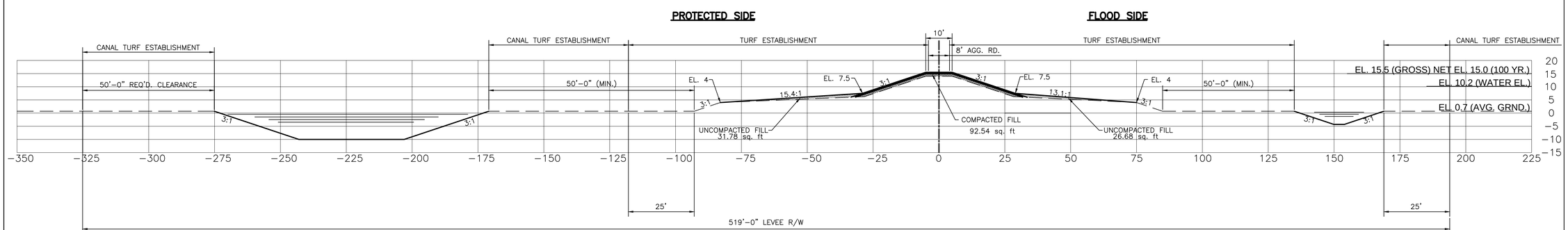
Note: See Sht. C2.1 For First Lift Section



Levee Section C−5 (Sta. 278+67.81 thru Sta. 304+61.43)

First Lift

Note: See Sht. C2.1 For First Lift Section



Levee Section C−4 (Sta. 228+33.14 thru Sta. 278+67.81)

First Lift

Note: See Sht. C2.1 For First Lift Section

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C3.1

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PLD PROJECT

USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS: Alignment C

BKI
MA GSA

DESIGNED DEB/TNP
CHECKED HMP
DETAILED GAD
CHECKED DEB/TNP
DATE 03/2014
SHEET 19 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill

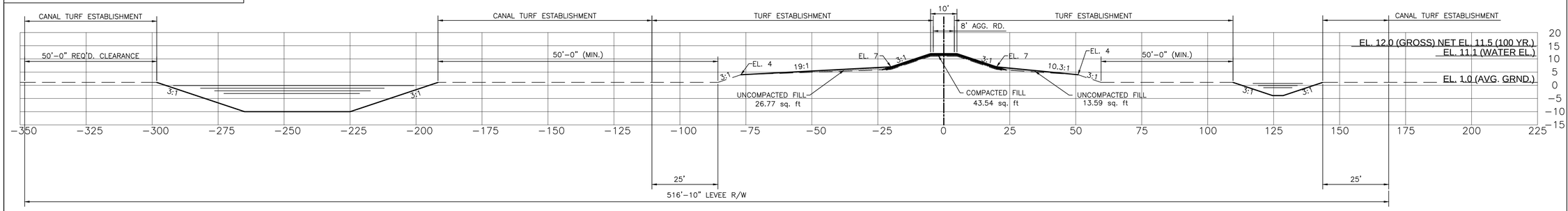
GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40

SCALE IN FEET

PROTECTED SIDE **FLOOD SIDE**

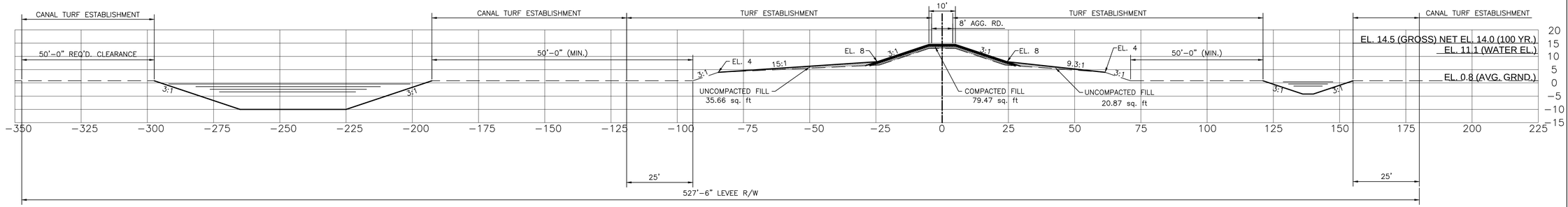


Levee Section C−9 (Sta. 473+00.00 thru Sta. 507+96.35)

First Lift

Note: See Sht. C2.2 For First Lift Section

PROTECTED SIDE **FLOOD SIDE**

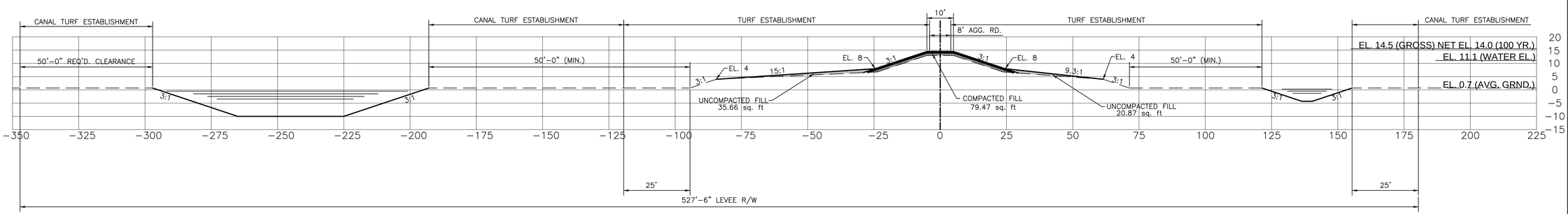


Levee Section C−8 (Sta. 375+00.00 thru Sta. 473+00.00)

First Lift

Note: See Sht. C2.2 For First Lift Section

PROTECTED SIDE **FLOOD SIDE**



Levee Section C−7 (Sta. 354+14.27 thru Sta. 375+00.00)

First Lift

Note: See Sht. C2.2 For First Lift Section

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C3.2

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE FLANS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	GAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	20 of 45

NO.	DATE	REVISION DESCRIPTION	BY

FILE NAME: X.DWG DATE: XREF: NONE

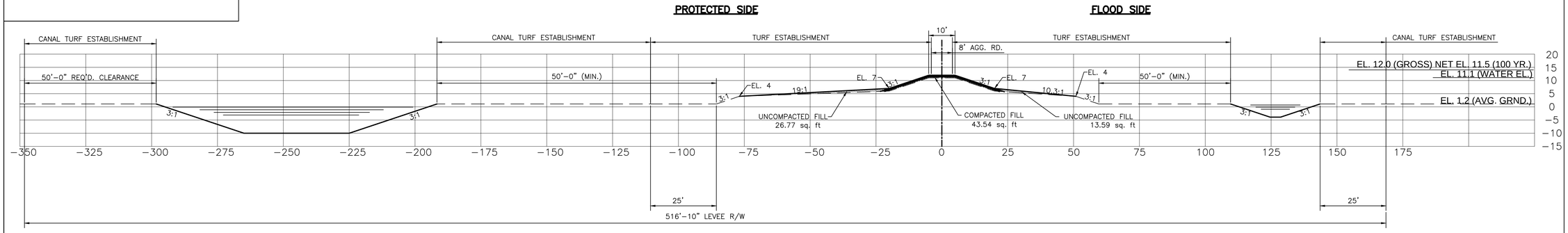
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET



Levee Section C−10 (Sta. 507+96.35 thru Sta. 542+92.72)

First Lift

Note: See Sht. C2.3 For First Lift Section

SHEET NUMBER C3.3

ST. CH-RLES / ST. JOHN THE B-PTIST
ST. J-MES / -SCENSION P-RISHES

P-RISH | PLD PROJECT | US-ACE PROJECT

WEST SHORE – L-KE PONTCH-RTR-IN, L-
HURRIC-NE PROTECTION PROJECT
P-RISHES OF ST. CH-RLES, ST. JOHN THE B-PTIST,
ST. J-MES, -ND -SCENSION

LEVEE FL-NS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DET-ILED	GAD
CHECKED	DEB/TNP
D-TE	03/2014
SHEET	21 OF 45

NO.	D-TE	REVISION DESCRIPTION	BY

ALIGNMENT C4 – 3rd LIFT (Year 2030)

Legend

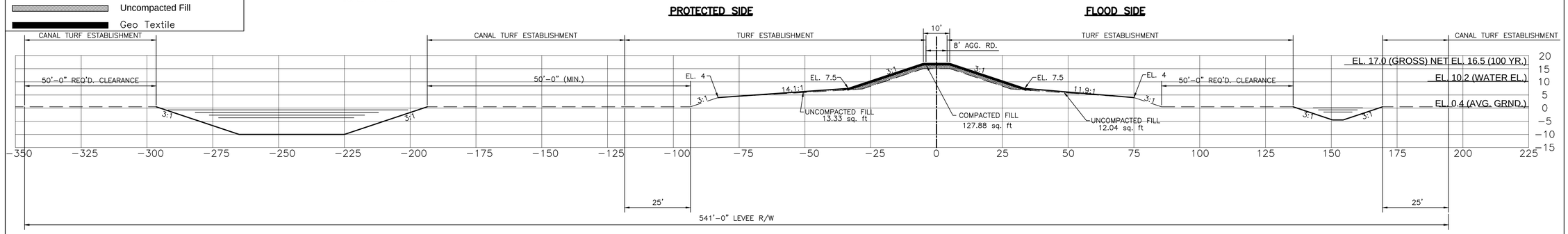
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

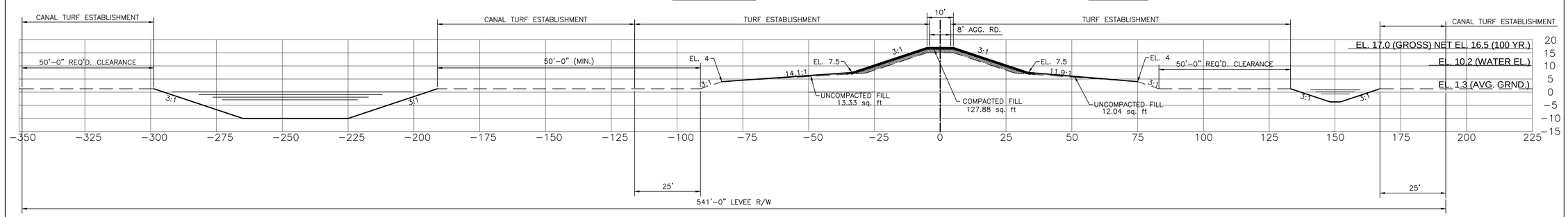
20 0 20 40

SCALE IN FEET



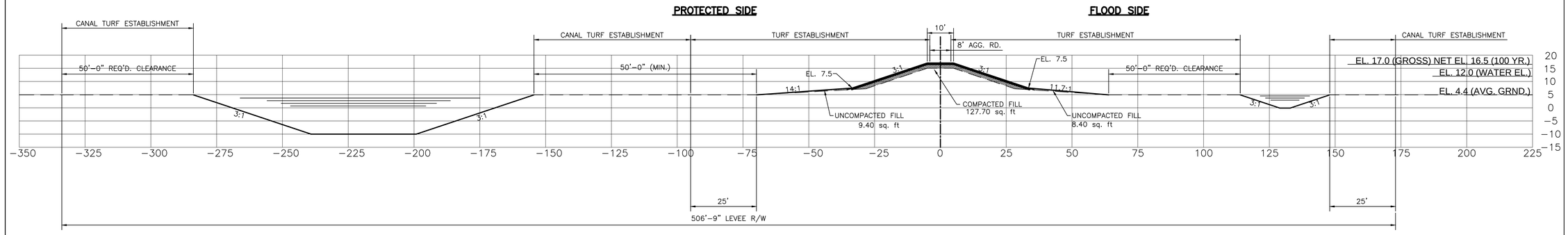
Levee Section C−3 (Sta. 178+00.00 thru Sta. 228+33.14)

First Lift



Levee Section C−2 (Sta. 129+17.02 thru Sta. 178+00.00)

First Lift



Levee Section C−1 (Sta. 100+00 thru Sta. 129+17.02)

First Lift

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C4.0

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE ELANS | Alignment C

BKI
MA GSA

DESIGNED / CHECKED	DETAILED / CHECKED	DATE / SHEET
DEB/TNP / HMP	GAD / DEB/TNP	03/2014 / 22 of 45

NO.	DATE	REVISION DESCRIPTION	BY

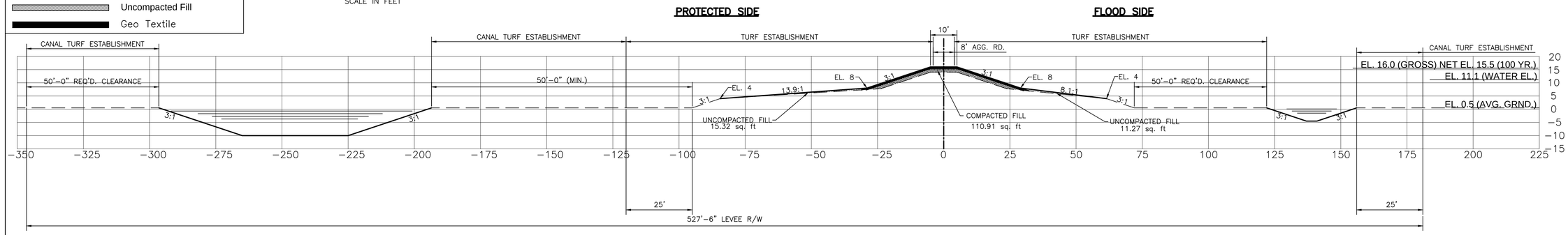
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

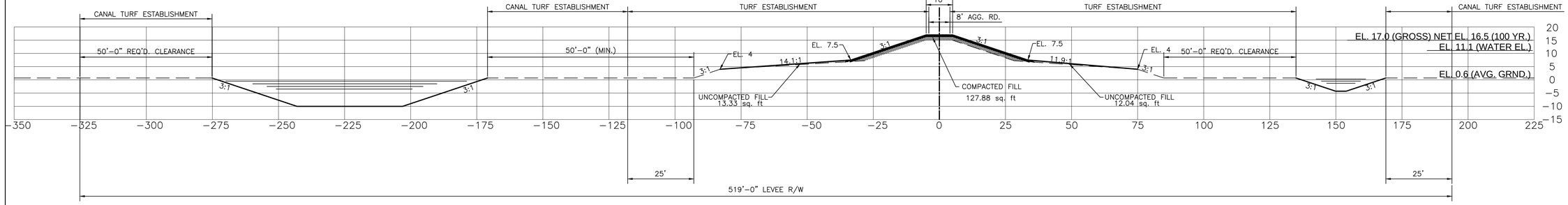
1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET



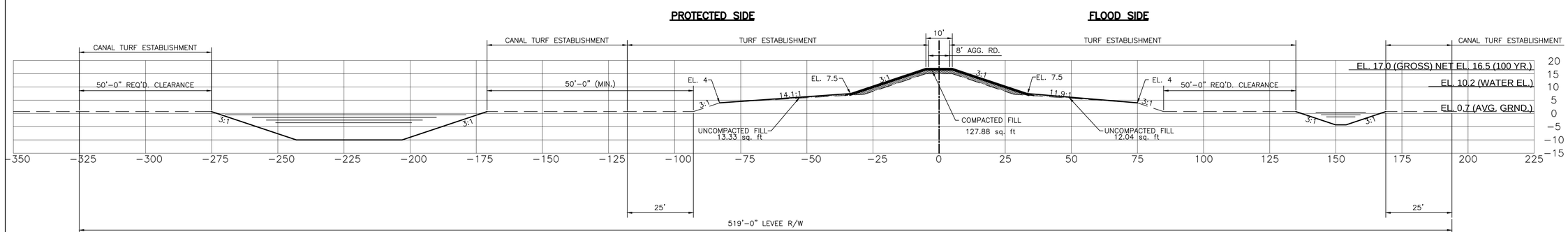
Levee Section C−6 (Sta. 304+61.43 thru Sta. 354+14.27)

First Lift



Levee Section C−5 (Sta. 278+67.81 thru Sta. 304+61.43)

First Lift



Levee Section C−4 (Sta. 228+33.14 thru Sta. 278+67.81)

First Lift

XREF: NONE
DATE:
FILE NAME: X.DWG

SHEET NUMBER C4.1

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	GAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	23 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

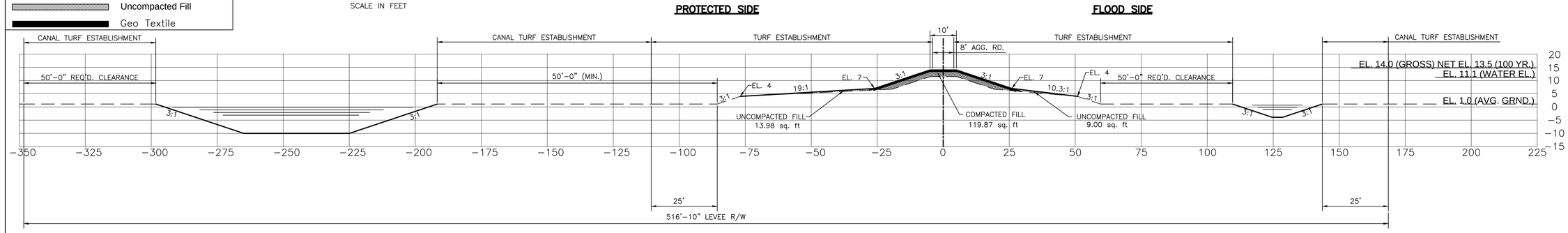
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

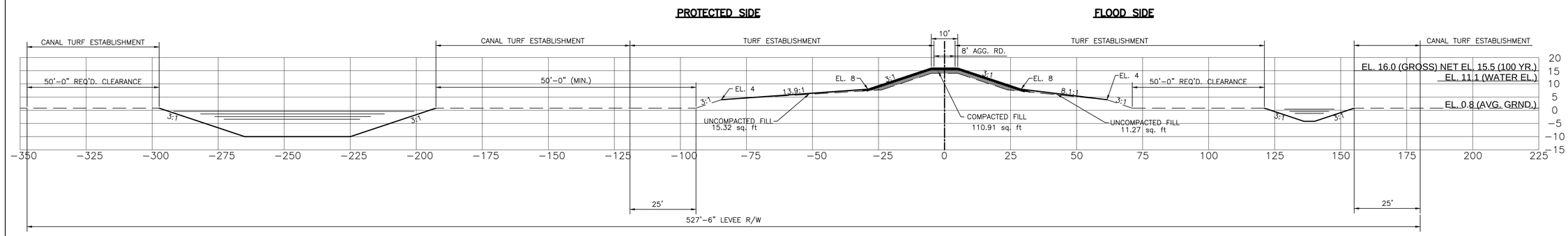
1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET



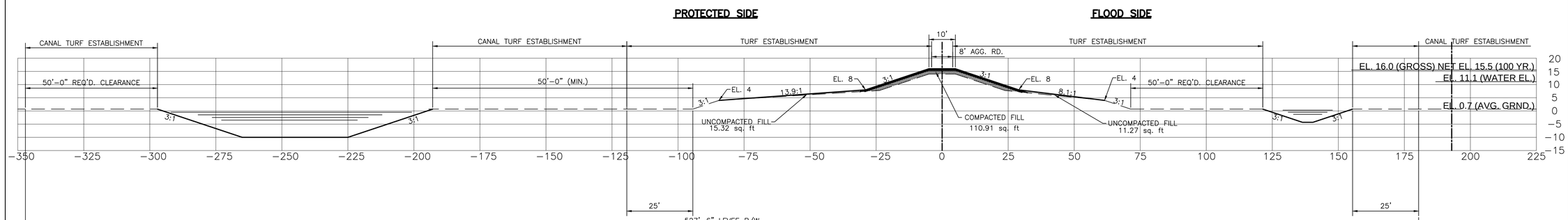
Levee Section C−9 (Sta. 473+00.00 thru Sta. 507+96.35)

First Lift



Levee Section C−8 (Sta. 375+00.00 thru Sta. 473+00.00)

First Lift



Levee Section C−7 (Sta. 354+14.27 thru Sta. 375+00.00)

First Lift

XREF: NONE
DATE:
FILE NAME: X.DWG

SHEET NUMBER C4.2

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE | FLANKS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	CAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	24 of 45

NO.	DATE	REVISION DESCRIPTION	BY

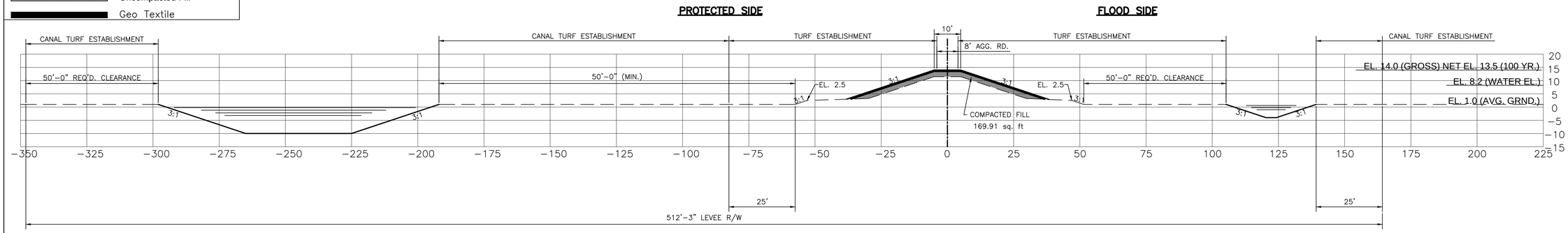
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

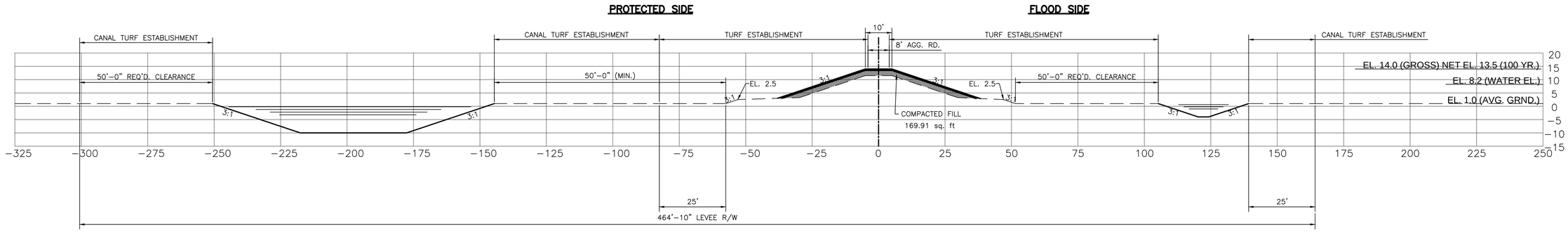
1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET



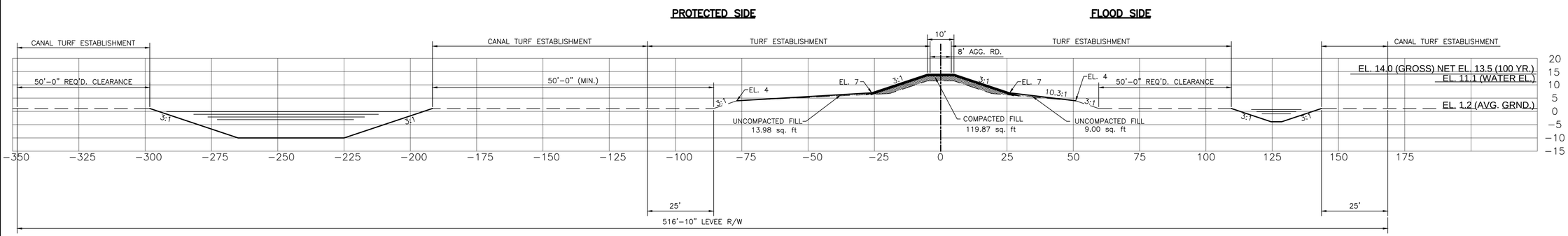
Levee Section C−12 (Sta. 577+89.09 thru Sta. 612+85.46)

First Lift



Levee Section C−11 (Sta. 542+92.72 thru Sta. 577+89.09)

First Lift



Levee Section C−10 (Sta. 507+96.35 thru Sta. 542+92.72)

First Lift

XREF: NONE
DATE:
FILE NAME: X.DWG

SHEET NUMBER C4.3

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	CAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	25 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

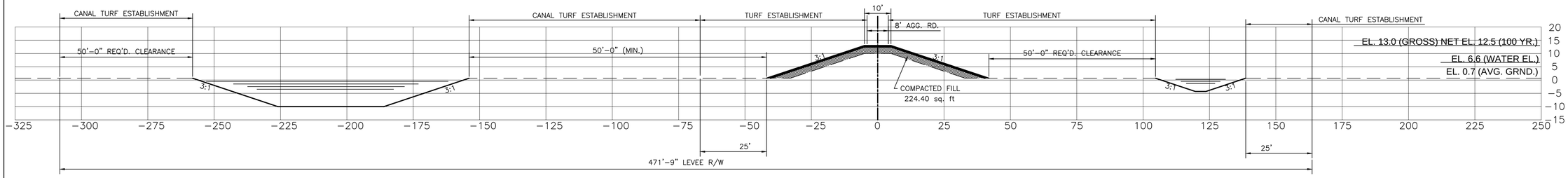
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

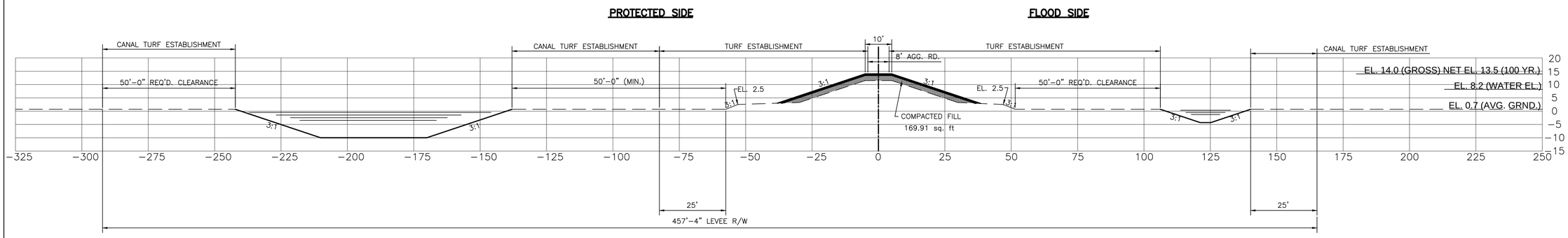
20 0 20 40

SCALE IN FEET



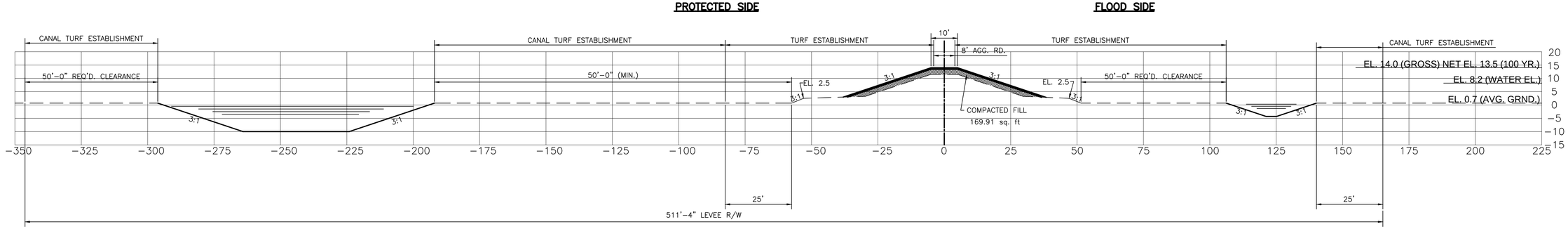
Levee Section C−15 (Sta. 681+62.66 thru Sta. 721+94.13)

First Lift



Levee Section C−14 (Sta. 653+16.92 thru Sta. 681+62.66)

First Lift



Levee Section C−13 (Sta. 612+85.46 thru Sta. 653+16.92)

First Lift

SHEET NUMBER C4.4

ST. CHARLES / ST. JOHN THE BAPTIST
ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE FILES | Alignment C

BKI
MA GSA

DESIGNED / CHECKED	DETAILED / CHECKED	DATE / SHEET
DEB/TNP HMP	GAD DEB/TNP	03/2014 26 of 45

NO.	DATE	REVISION DESCRIPTION	BY

XREF: NONE

DATE:

FILE NAME: X.DWG

Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

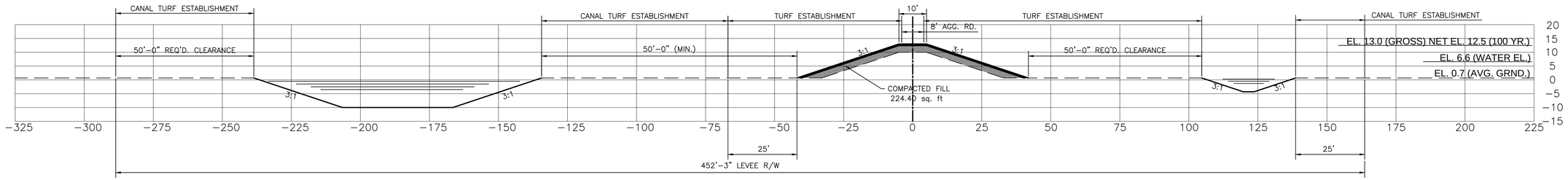
GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40

SCALE IN FEET

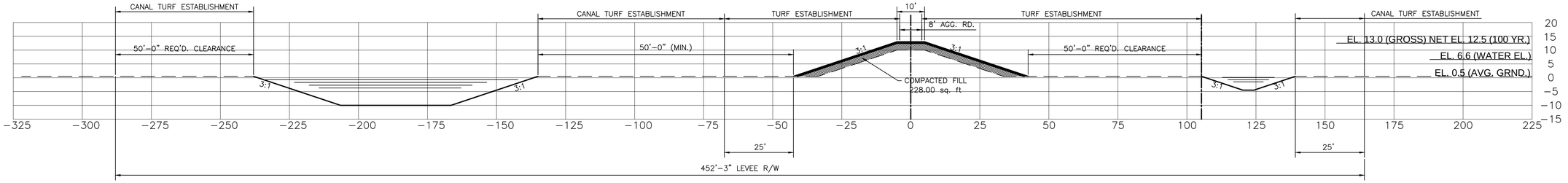
PROTECTED SIDE **FLOOD SIDE**



Levee Section C−18 (Sta. 821+54.25 thru Sta. 850+00.00)

First Lift

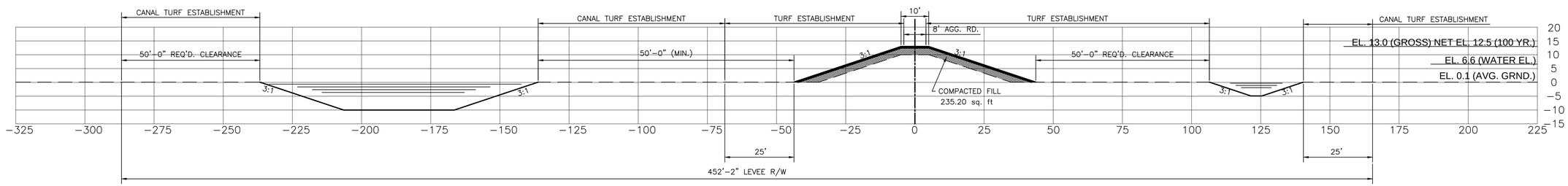
PROTECTED SIDE **FLOOD SIDE**



Levee Section C−17 (Sta. 740+91.43 thru Sta. 821+54.25)

First Lift

PROTECTED SIDE **FLOOD SIDE**



Levee Section C−16 (Sta. 721+94.13 thru Sta. 740+91.31)

First Lift

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C4.5

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP	GAD	DEB/TNP	03/2014
CHECKED	HMP			
DETAILED		DATE		SHEET 27 OF 45
CHECKED				

NO.	DATE	REVISION DESCRIPTION	BY

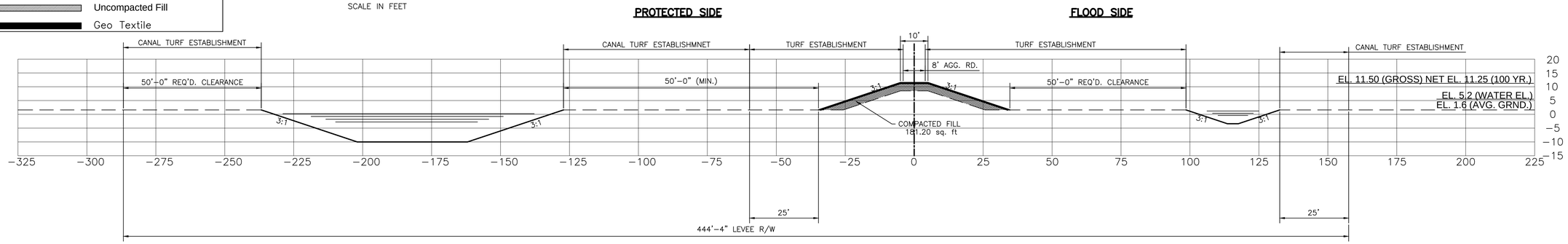
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

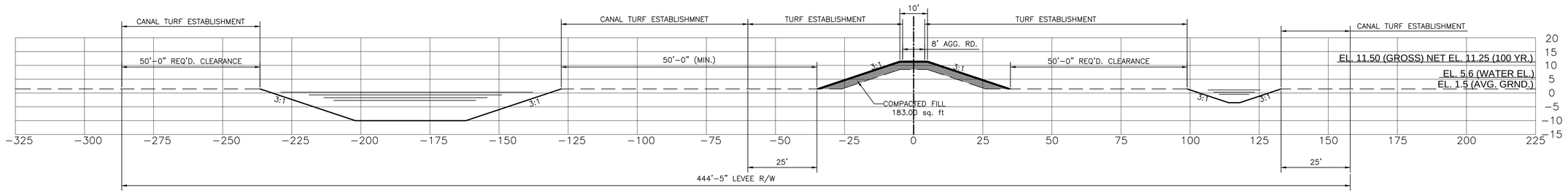
1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET



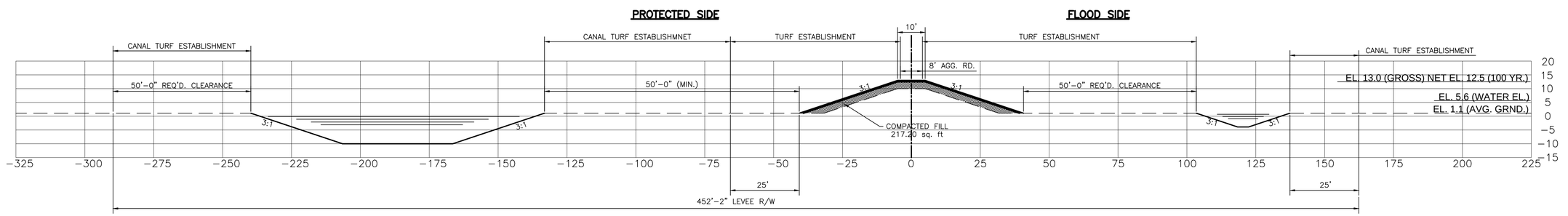
Levee Section C−21 (Sta. 945+00.00 thru Sta. 967+91.21)

First Lift



Levee Section C−20 (Sta. 905+00.00 thru Sta. 945+00.00)

First Lift



Levee Section C−19 (Sta. 850+00.00 thru Sta. 905+00.00)

First Lift

XREF: NONE
DATE:
FILE NAME: X.DWG

SHEET NUMBER C4.6

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	GAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	28 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

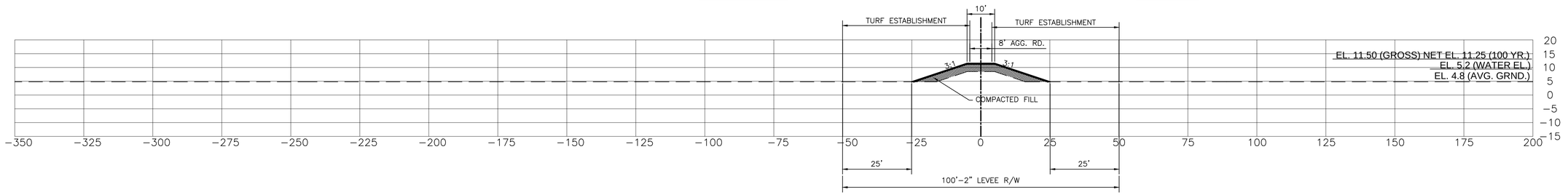
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40

SCALE IN FEET



Levee Section C−22 (Sta. 967+91.21 thru Sta. 1063+87.55)

First Lift

FILE NAME: X.DWG DATE: XREF: NONE

NO.	REVISION DESCRIPTION	BY
	D-TE	

DESIGNED DEB/TNP
CHECKED HMP
DET-ILED GAD
CHECKED DEB/TNP
D-TE 03/2014
SHEET 29 OF 45

BKI
MA GSA

WEST SHORE – L-KE PONTCH-RTR-IN, L-
HURRIC-NE PROTECTION PROJECT
P-RISHES OF ST. CH-RLES, ST. JOHN THE B-PTIST,
ST. J-MES, -ND -SCENSION

LEVEE PL-NS | Alignment C

P-RISH | PLD PROJECT | US-CE PROJECT

ST. CH-RLES / ST. JOHN THE B-PTIST
ST. J-MES / -SCENSION P-RISHES

SHEET NUMBER C4.7

ALIGNMENT C5 – 4th LIFT (Year 2045)

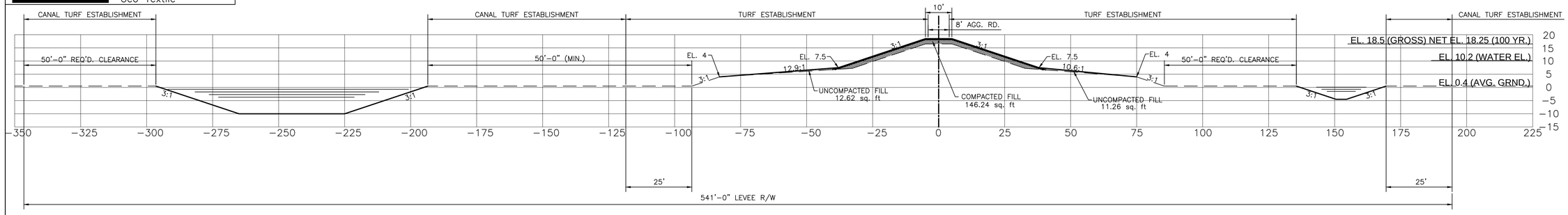
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

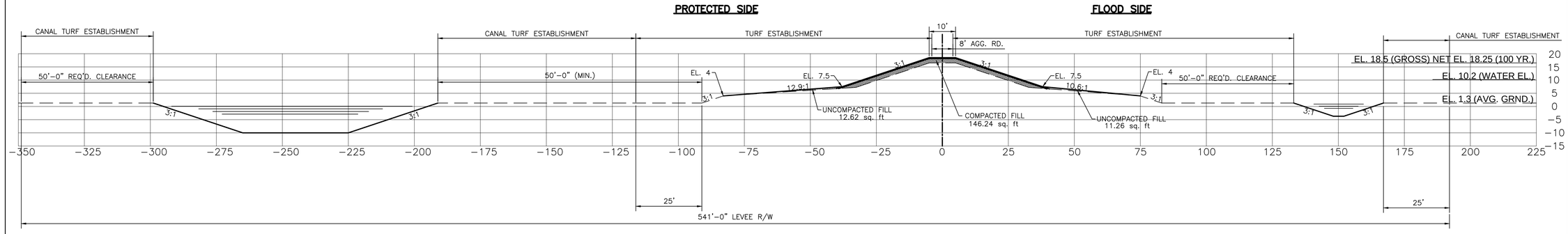
1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET



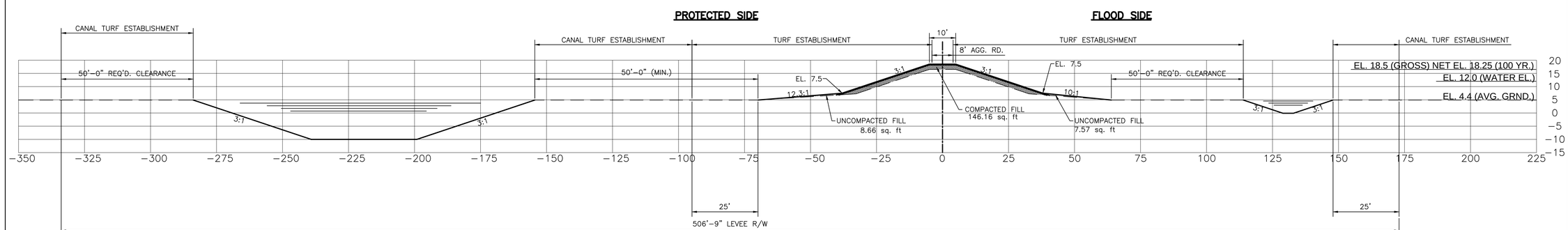
Levee Section C−3 (Sta. 178+00.00 thru Sta. 228+33.14)

First Lift



Levee Section C−2 (Sta. 129+17.02 thru Sta. 178+00.00)

First Lift



Levee Section C−1 (Sta. 100+00 thru Sta. 129+17.02)

First Lift

XREF: NONE
DATE:
FILE NAME: X.DWG

SHEET NUMBER C5.0

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE / FLOOD WALL | Alignment C

BKI
MA GSA

DESIGNED / CHECKED	DETAILED / CHECKED	DATE	SHEET
DEB/TNP HMP	GAD DEB/TNP	03/2014	30 of 45

NO.	DATE	REVISION DESCRIPTION	BY

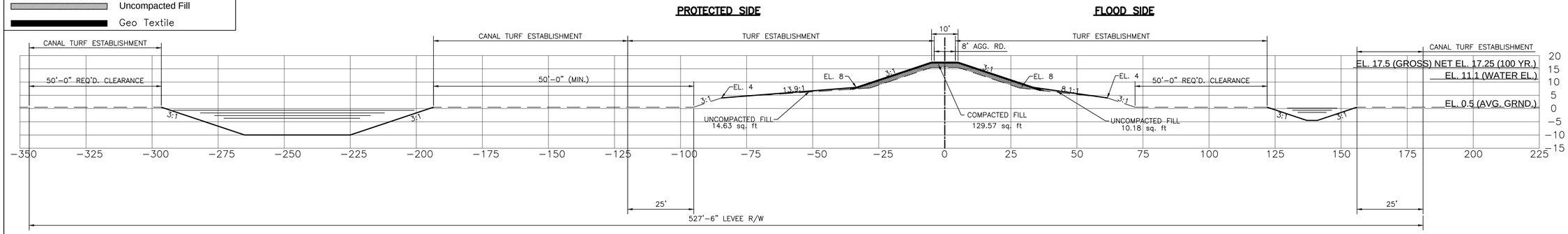
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

20 0 20 40
SCALE IN FEET

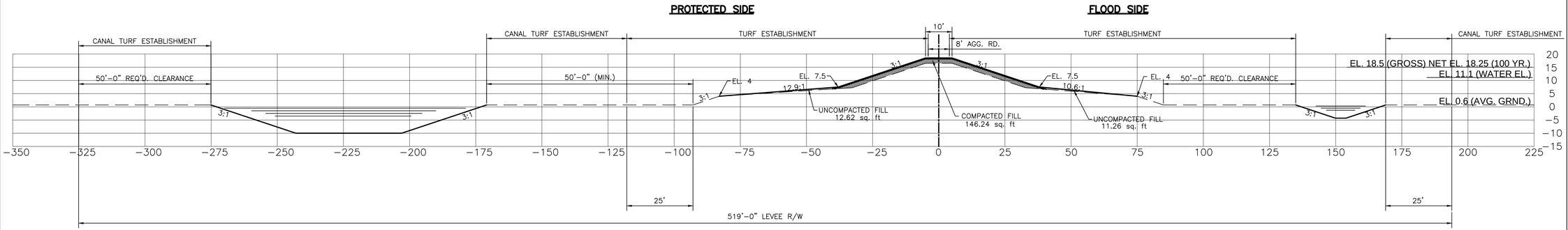
GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88



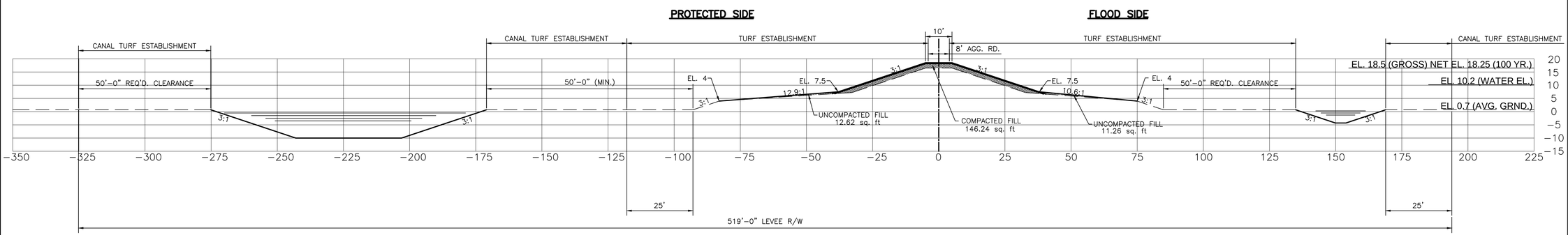
Levee Section C−6 (Sta. 304+61.43 thru Sta. 354+14.27)

First Lift



Levee Section C−5 (Sta. 278+67.81 thru Sta. 304+61.43)

First Lift



Levee Section C−4 (Sta. 228+33.14 thru Sta. 278+67.81)

First Lift

SHEET NUMBER C5.1

ST. CHARLES / ST. JOHN THE BAPTIST
ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE FLANS | Alignment C

BKI
MA GSA

DESIGNED / CHECKED	DETAILED / CHECKED	DATE / SHEET
DEB/TNP HMP	CAD DEB/TNP	03/2014 31 of 45

NO.	DATE	REVISION DESCRIPTION	BY

XREF: NONE
DATE:
FILE NAME: X.DWG

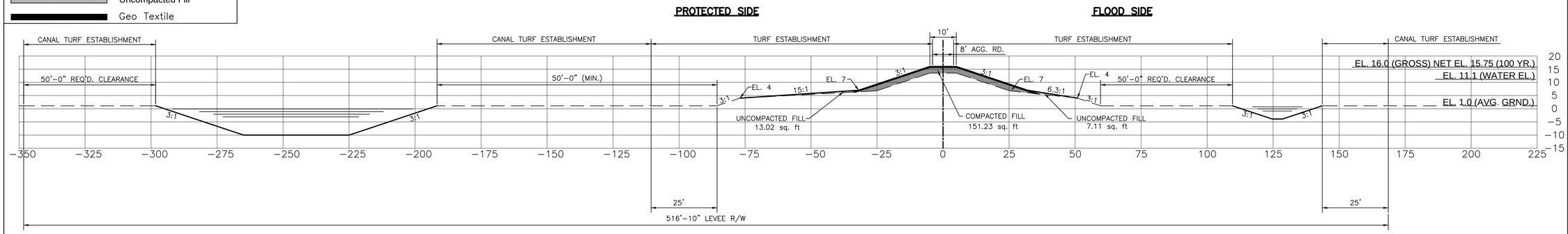
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

20 0 20 40
SCALE IN FEET

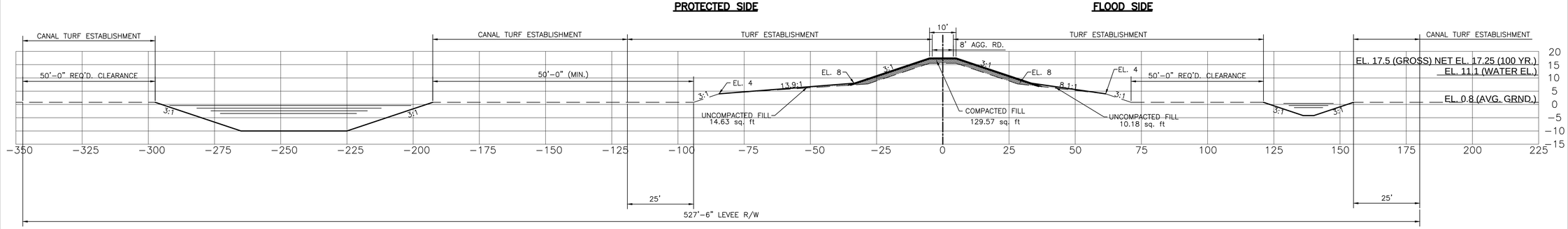
GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88



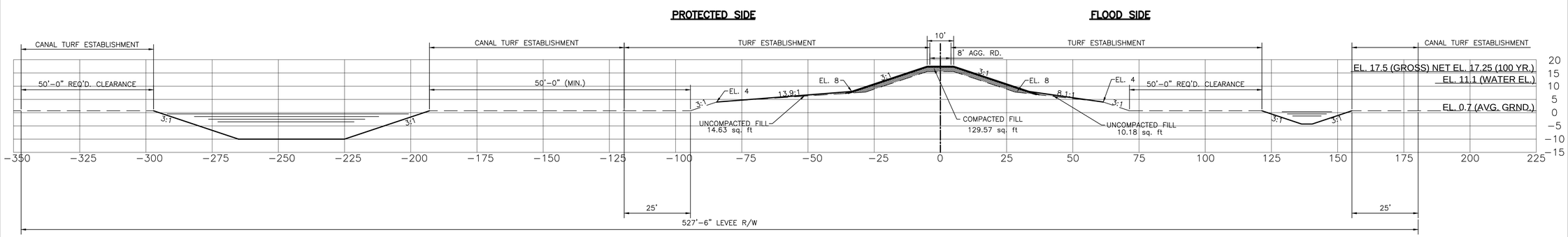
Levee Section C−9 (Sta. 473+00.00 thru Sta. 507+96.35)

First Lift



Levee Section C−8 (Sta. 375+00.00 thru Sta. 473+00.00)

First Lift



Levee Section C−7 (Sta. 354+14.27 thru Sta. 375+00.00)

First Lift

XREF: NONE
DATE:
FILE NAME: X.DWG

SHEET NUMBER C5.2

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	GAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	32 OF 45

NO. | DATE | REVISION DESCRIPTION | BY

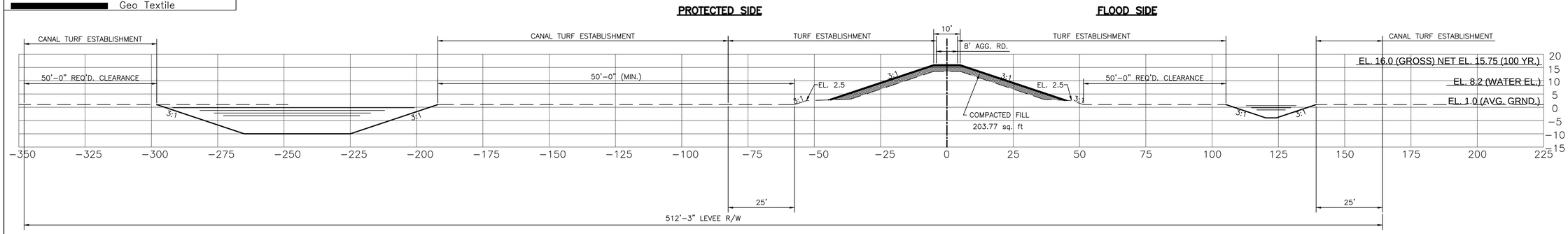
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

20 0 20 40
SCALE IN FEET

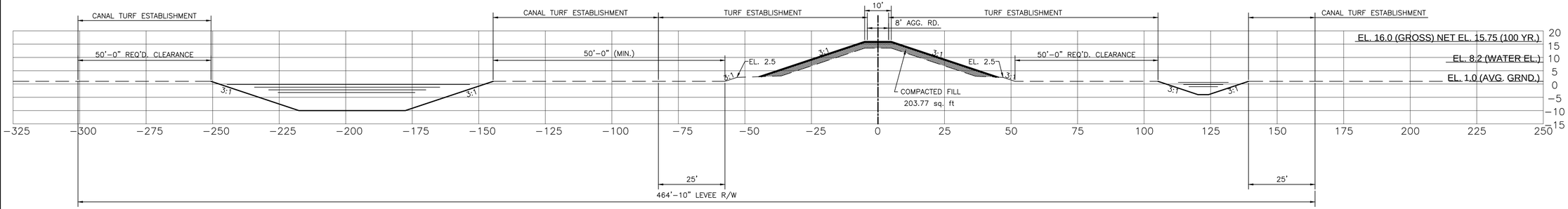
GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88



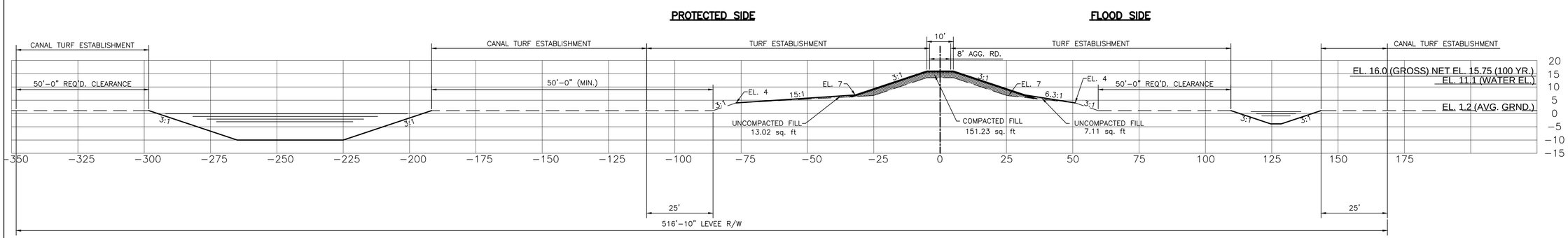
Levee Section C−12 (Sta. 577+89.09 thru Sta. 612+85.46)

First Lift



Levee Section C−11 (Sta. 542+92.72 thru Sta. 577+89.09)

First Lift



Levee Section C−10 (Sta. 507+96.35 thru Sta. 542+92.72)

First Lift

XREF: NONE
DATE:
FILE NAME: X.DWG

SHEET NUMBER C5.3

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	GAD DEB/TNP
CHECKED	
DATE	03/2014
SHEET	33 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

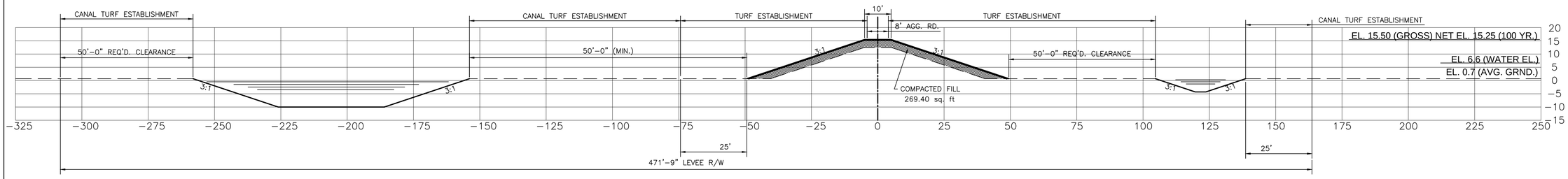
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

20 0 20 40
SCALE IN FEET

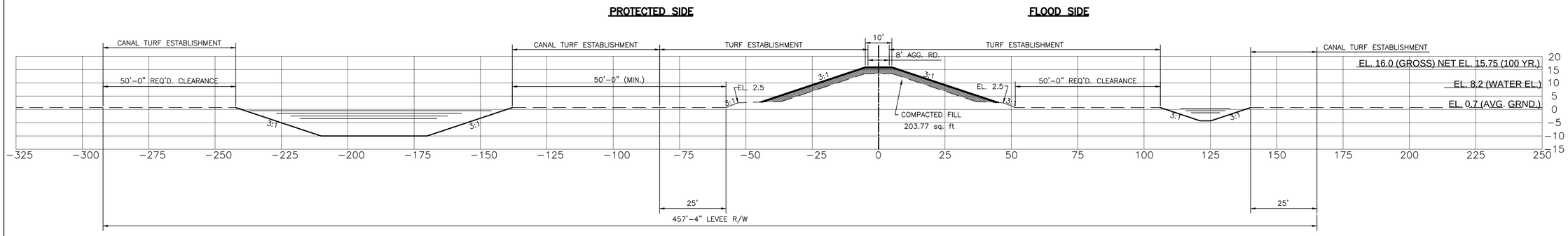
GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88



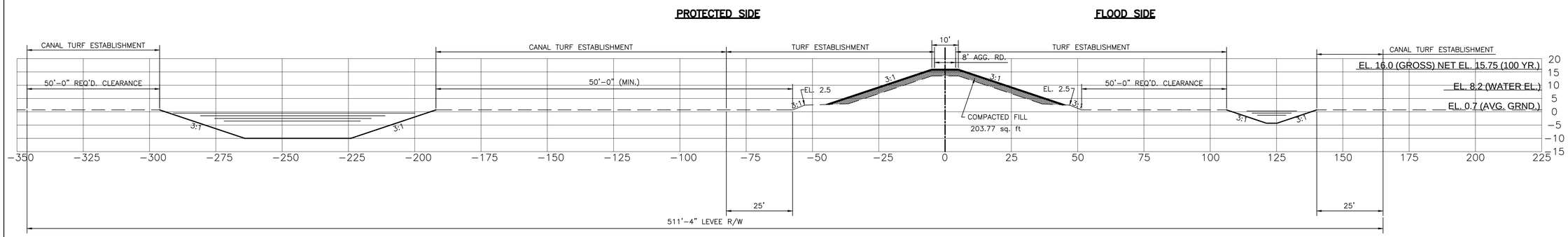
Levee Section C−15 (Sta. 681+62.66 thru Sta. 721+94.13)

First Lift



Levee Section C−14 (Sta. 653+16.92 thru Sta. 681+62.66)

First Lift



Levee Section C−13 (Sta. 612+85.46 thru Sta. 653+16.92)

First Lift

SHEET NUMBER C5.4

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE ELANS | Alignment C

BKI
MA GSA

DESIGNED / CHECKED	DETAILED / CHECKED	DATE / SHEET
DEB/TNP HMP	GAD DEB/TNP	03/2014 34 of 45

NO.	DATE	REVISION DESCRIPTION	BY

XREF: NONE

DATE:

FILE NAME: X.DWG

Legend

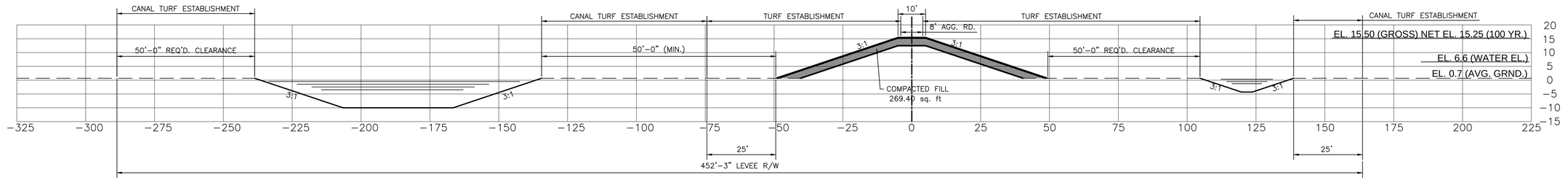
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET

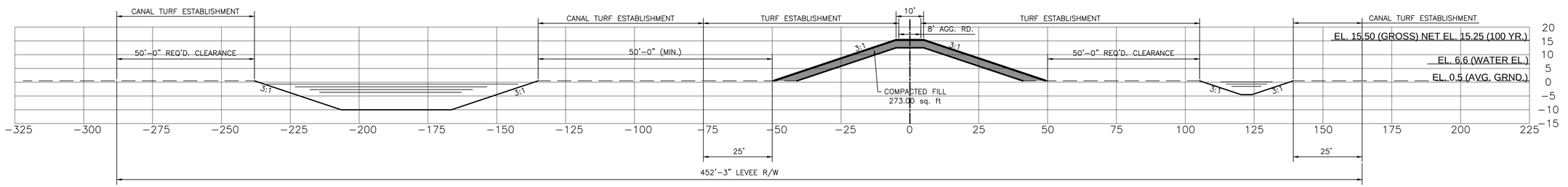
PROTECTED SIDE **FLOOD SIDE**



Levee Section C−18 (Sta. 821+54.25 thru Sta. 850+00.00)

First Lift

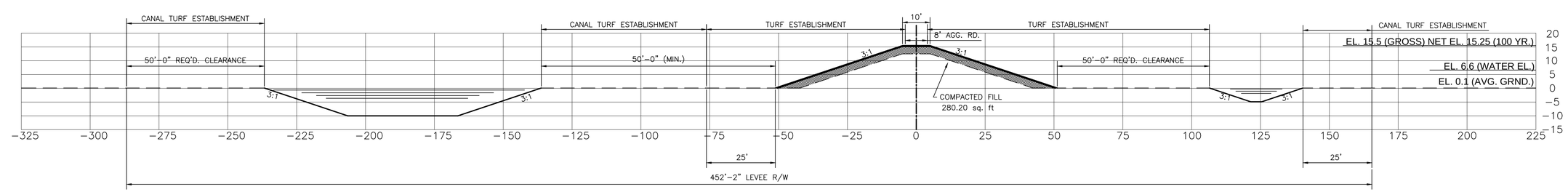
PROTECTED SIDE **FLOOD SIDE**



Levee Section C−17 (Sta. 740+91.43 thru Sta. 821+54.25)

First Lift

PROTECTED SIDE **FLOOD SIDE**



Levee Section C−16 (Sta. 721+94.13 thru Sta. 740+91.31)

First Lift

XREF: NONE
DATE:
FILE NAME: X.DWG

SHEET NUMBER C5.5

PARISH | PLD PROJECT | USACE PROJECT

ST. CHARLES / ST. JOHN THE BAPTIST
ST. JAMES / ASCENSION PARISHES

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	CAD
CHECKED	DEB/TNP
DATE	03/2014
SHEET	35 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

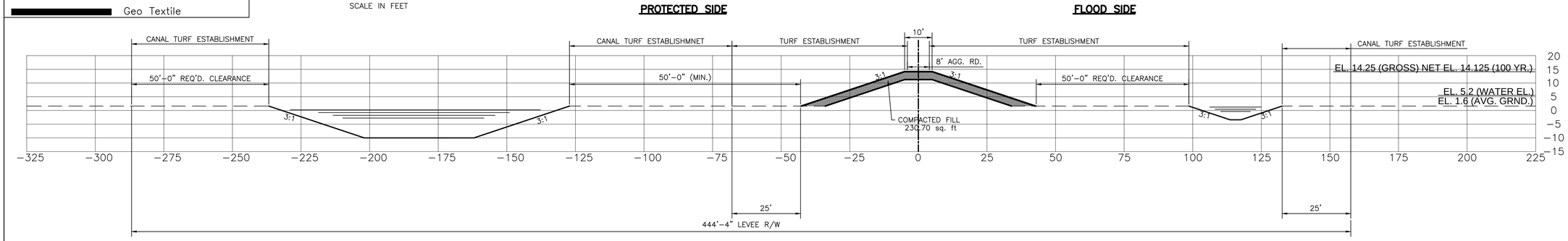
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

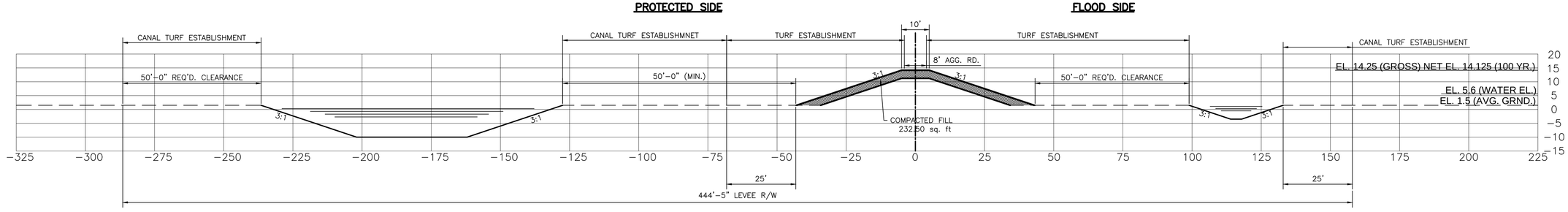
20 0 20 40

SCALE IN FEET



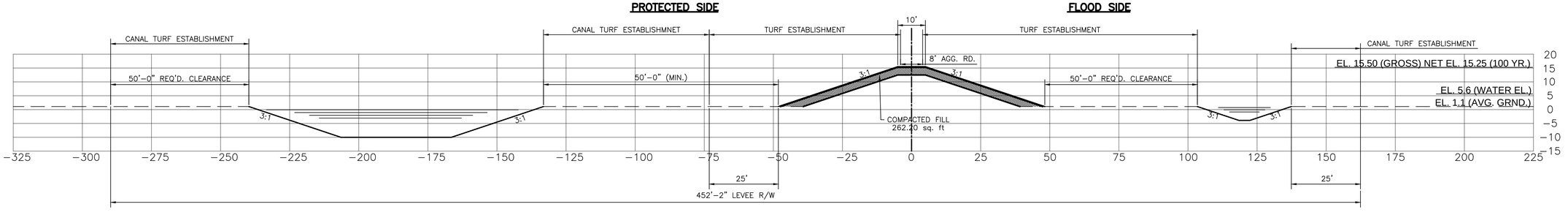
Levee Section C−21 (Sta. 945+00.00 thru Sta. 967+91.21)

First Lift



Levee Section C−20 (Sta. 905+00.00 thru Sta. 945+00.00)

First Lift



Levee Section C−19 (Sta. 850+00.00 thru Sta. 905+00.00)

First Lift

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C5.6

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PLD PROJECT

USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS: Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP HMP
CHECKED	
DETAILED	GAD DEB/TNP
CHECKED	
DATE	03/2014
SHEET	36 of 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

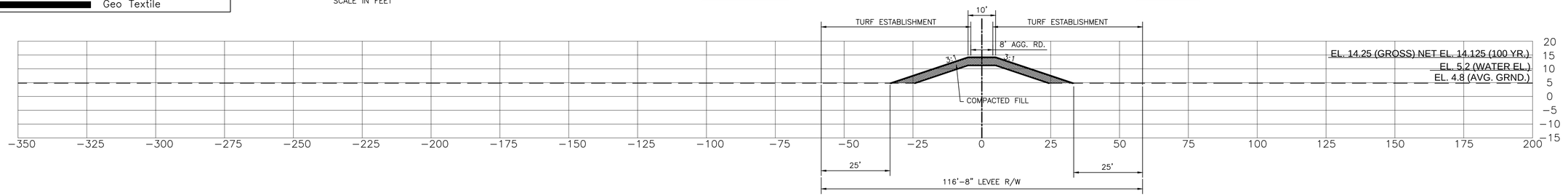
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40

SCALE IN FEET



Levee Section C−22 (Sta. 967+91.21 thru Sta. 1063+87.55)

First Lift

FILE NAME: X.DWG DATE: XREF: NONE

NO.	REVISION DESCRIPTION	BY
	D-TE	

DESIGNED DEB/TNP
CHECKED HMP
DET-ILED GAD
CHECKED DEB/TNP
D-TE 03/2014
SHEET 37 OF 45

BKI
MA GSA

WEST SHORE – L-KE PONTCH-RTR-IN, L-
HURRIC-NE PROTECTION PROJECT
P-RISHES OF ST. CH-RLES, ST. JOHN THE B-PTIST,
ST. J-MES, -ND -SCENSION

LEVEE PL-NS | Alignment C

P-RISH | PLD PROJECT | US-ACE PROJECT

ST. CH-RLES / ST. JOHN THE B-PTIST
ST. J-MES / -SCENSION P-RISHES

SHEET NUMBER C5.7

ALIGNMENT C6 – 5th LIFT (Year 2060)

Legend

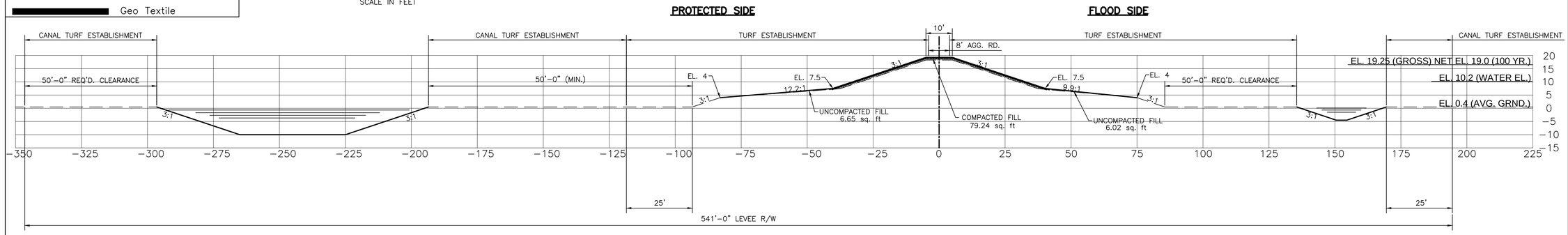
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

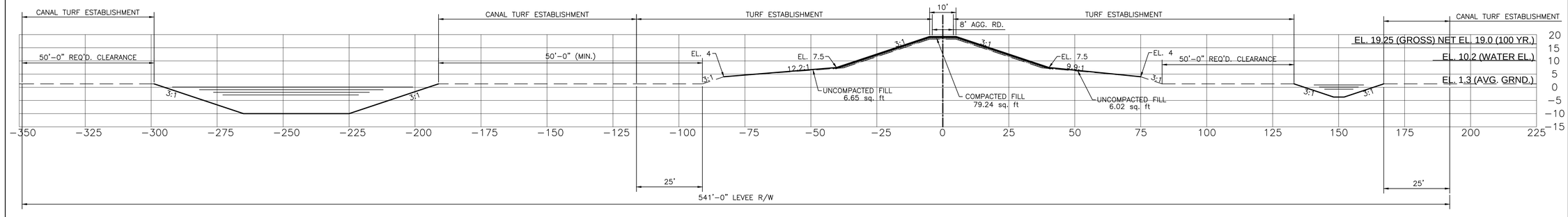
20 0 20 40

SCALE IN FEET



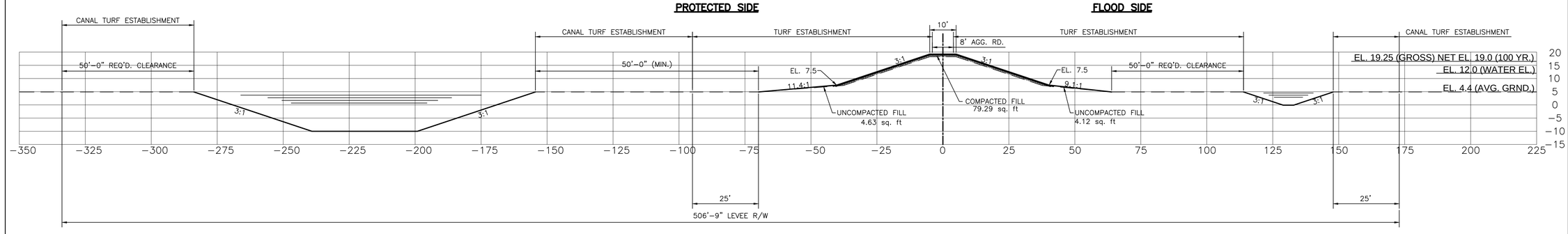
Levee Section C−3 (Sta. 178+00.00 thru Sta. 228+33.14)

First Lift



Levee Section C−2 (Sta. 129+17.02 thru Sta. 178+00.00)

First Lift



Levee Section C−1 (Sta. 100+00 thru Sta. 129+17.02)

First Lift

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C6.0

ST. CHARLES / ST. JOHN THE BAPTIST
ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS: Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP	GAD	03/2014
CHECKED	HMP	DEB/TNP	38 OF 45
DETAILED			
CHECKED			
DATE			
SHEET			

NO.	REVISION DESCRIPTION	BY	DATE

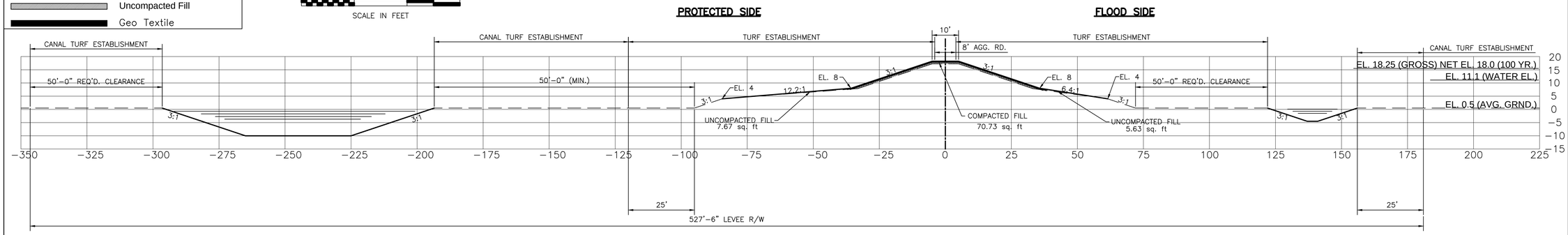
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

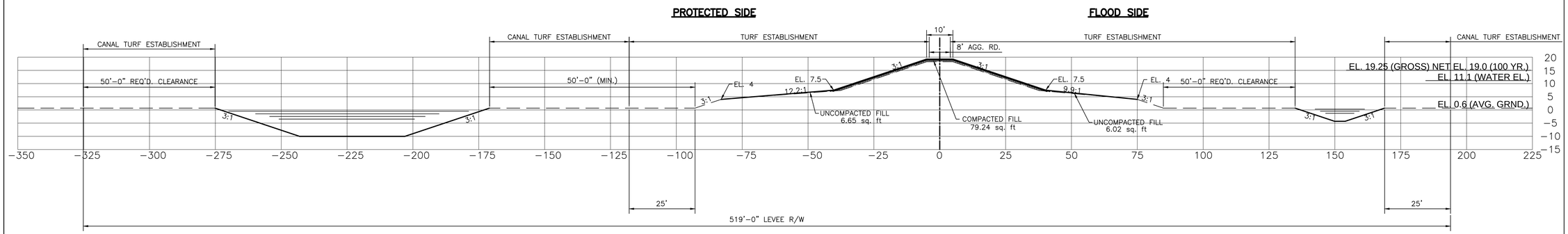
1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET



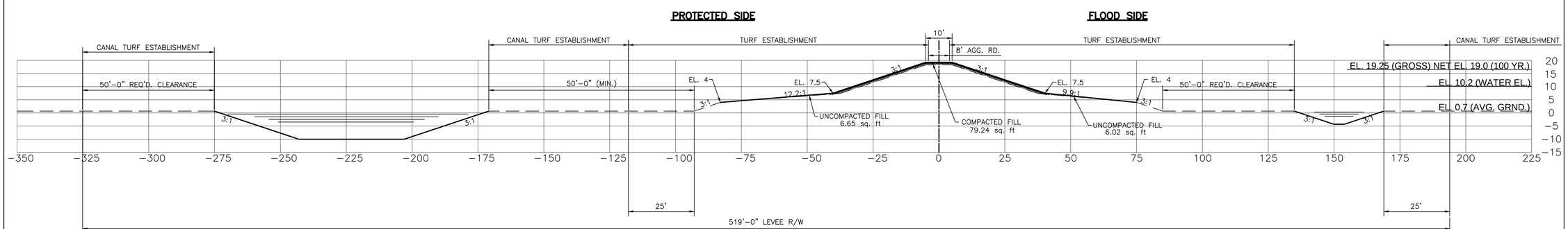
Levee Section C−6 (Sta. 304+61.43 thru Sta. 354+14.27)

First Lift



Levee Section C−5 (Sta. 278+67.81 thru Sta. 304+61.43)

First Lift



Levee Section C−4 (Sta. 228+33.14 thru Sta. 278+67.81)

First Lift

SHEET NUMBER C6.1

ST. CHARLES / ST. JOHN THE BAPTIST
ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE FLANS | Alignment C

BKI
MA GSA

DESIGNED / CHECKED	DETAILED / CHECKED	DATE / SHEET
DEB/TNP HMP	CAD DEB/TNP	03/2014 39 of 45

NO.	DATE	REVISION DESCRIPTION	BY

XREF: NONE
DATE:
FILE NAME: X.DWG

Legend

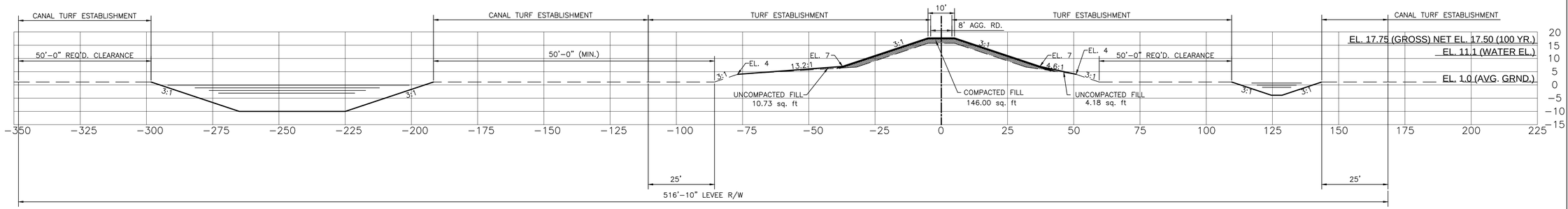
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET

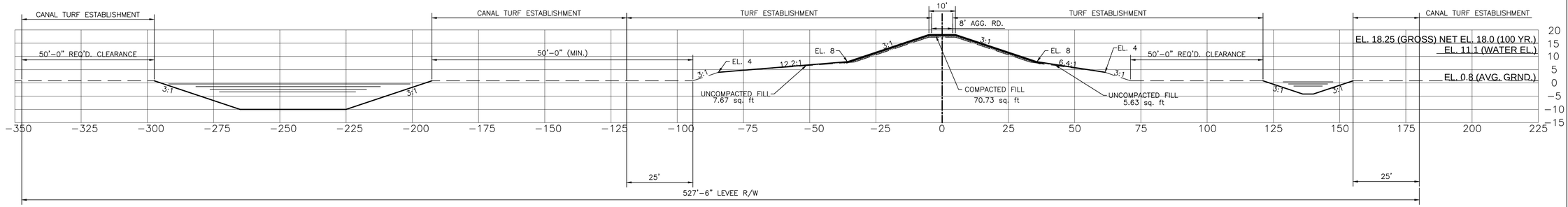
PROTECTED SIDE **FLOOD SIDE**



Levee Section C−9 (Sta. 473+00.00 thru Sta. 507+96.35)

First Lift

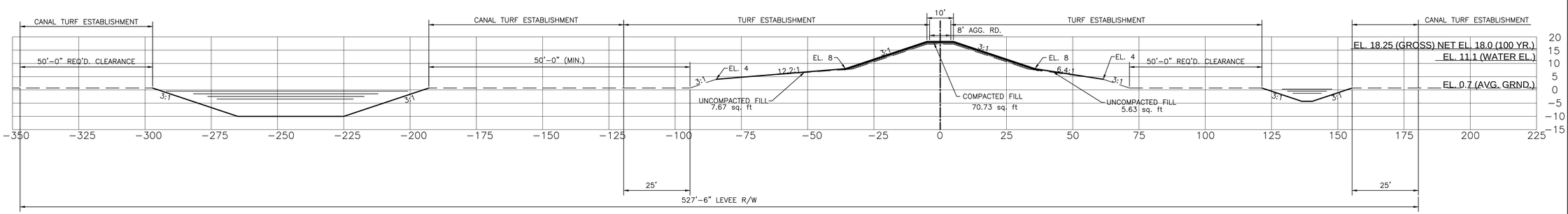
PROTECTED SIDE **FLOOD SIDE**



Levee Section C−8 (Sta. 375+00.00 thru Sta. 473+00.00)

First Lift

PROTECTED SIDE **FLOOD SIDE**



Levee Section C−7 (Sta. 354+14.27 thru Sta. 375+00.00)

First Lift

XREF: NONE
DATE:
FILE NAME: X.DWG

SHEET NUMBER C6.2

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE FLANS | Alignment C

BKI
MA GSA

DESIGNED / CHECKED	DEB/TNP HMP
DETAILED / CHECKED	CAD DEB/TNP
DATE	03/2014
SHEET	40 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

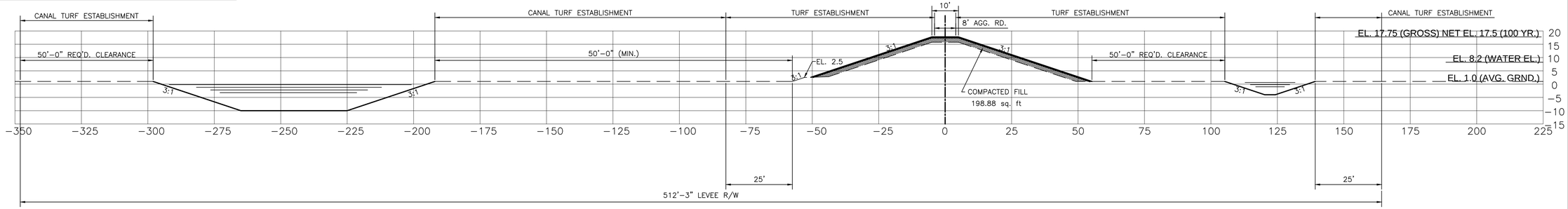
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET

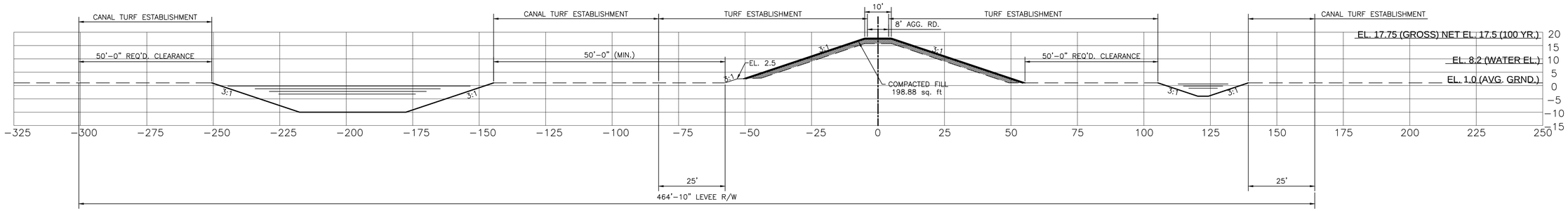
PROTECTED SIDE **FLOOD SIDE**



Levee Section C−12 (Sta. 577+89.09 thru Sta. 612+85.46)

First Lift

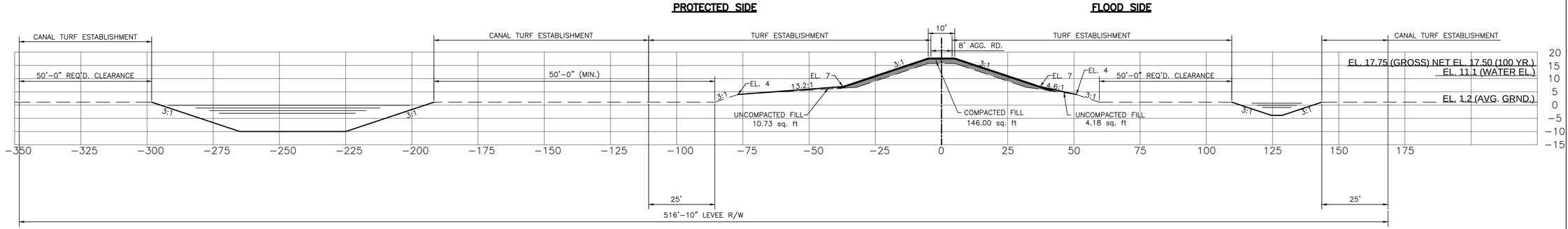
PROTECTED SIDE **FLOOD SIDE**



Levee Section C−11 (Sta. 542+92.72 thru Sta. 577+89.09)

First Lift

PROTECTED SIDE **FLOOD SIDE**



Levee Section C−10 (Sta. 507+96.35 thru Sta. 542+92.72)

First Lift

XREF: NONE
DATE:
FILE NAME: X.DWG

SHEET NUMBER C6.3

ST. CHARLES / ST. JOHN THE BAPTIST
ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS | Alignment C

STATE OF LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

BKI
MA GSA

DESIGNED	DEB/TNP	GAD	DEB/TNP	03/2014
CHECKED	HMP			
DETAILED		DATE		41 OF 45
CHECKED		SHEET		

NO.	DATE	REVISION DESCRIPTION	BY

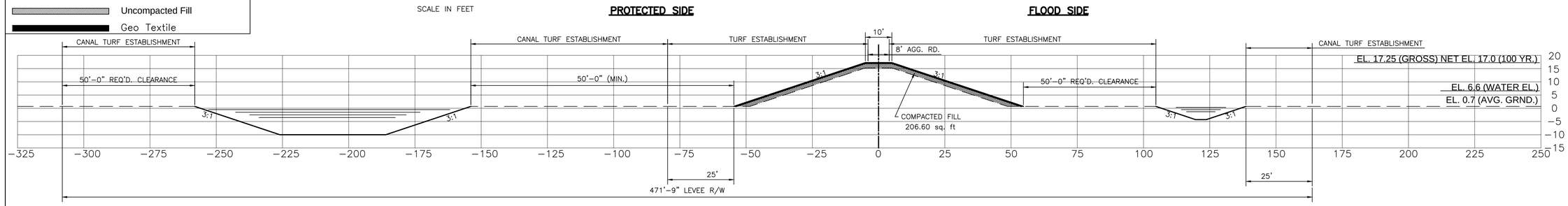
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

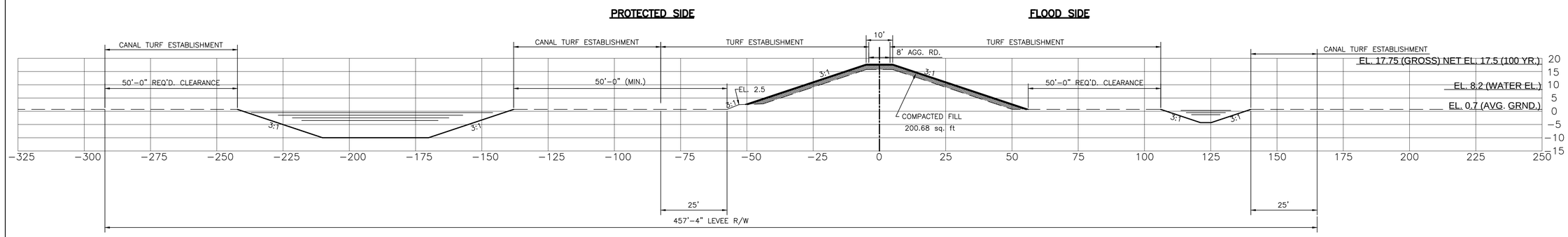
1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET



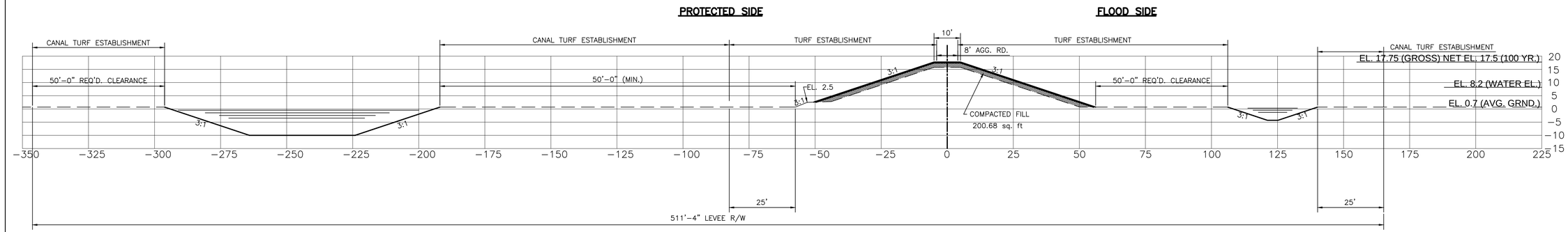
Levee Section C−15 (Sta. 681+62.66 thru Sta. 721+94.13)

First Lift



Levee Section C−14 (Sta. 653+16.92 thru Sta. 681+62.66)

First Lift



Levee Section C−13 (Sta. 612+85.46 thru Sta. 653+16.92)

First Lift

SHEET NUMBER C6.4

ST. CHARLES / ST. JOHN THE BAPTIST
ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE FLANKS | Alignment C

BKI
MA GSA

DESIGNED / CHECKED	DETAILED / CHECKED	DATE / SHEET
DEB/TNP / HMP	GAD / DEB/TNP	03/2014 / 42 of 45

NO.	DATE	REVISION DESCRIPTION	BY

XREF: NONE

DATE:

FILE NAME: X.DWG

Legend

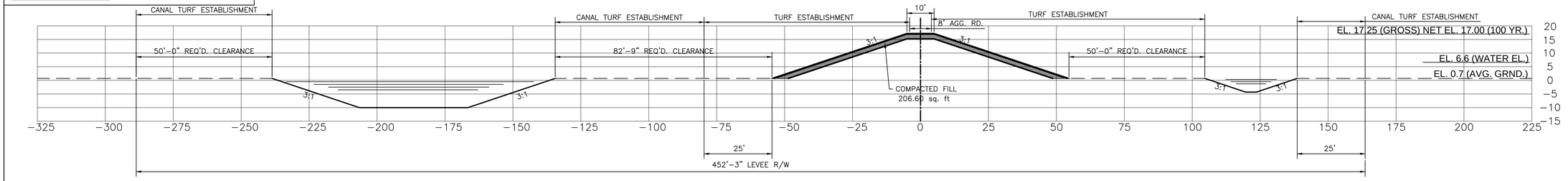
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET

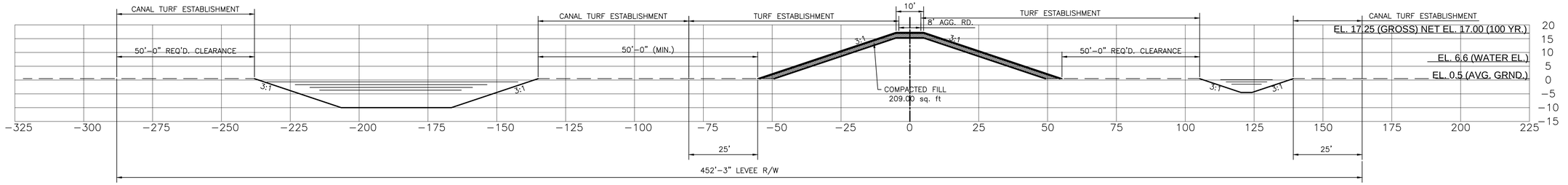
PROTECTED SIDE **FLOOD SIDE**



Levee Section C−18 (Sta. 821+54.25 thru Sta. 850+00.00)

First Lift

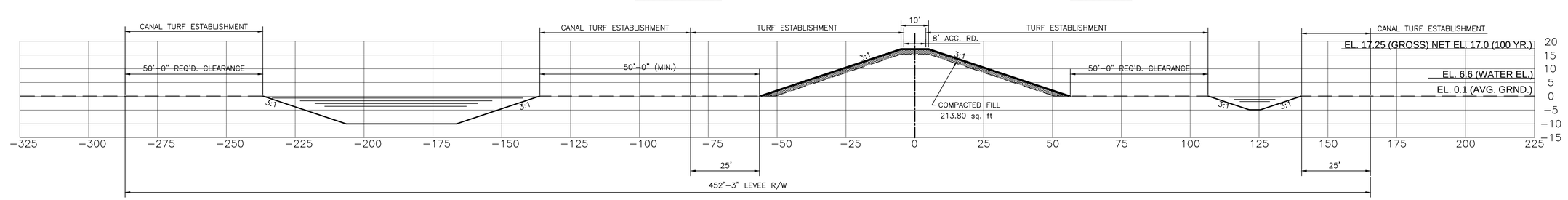
PROTECTED SIDE **FLOOD SIDE**



Levee Section C−17 (Sta. 740+91.43 thru Sta. 821+54.25)

First Lift

PROTECTED SIDE **FLOOD SIDE**



Levee Section C−16 (Sta. 721+94.13 thru Sta. 740+91.31)

First Lift

XREF: NONE
DATE:
FILE NAME: X.DWG

SHEET NUMBER C6.5

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP	GAD	DEB/TNP	DATE	03/2014
CHECKED	HMP	CHECKED		SHEET	43 OF 45
DETAILED					
CHECKED					

NO.	DATE	REVISION DESCRIPTION	BY

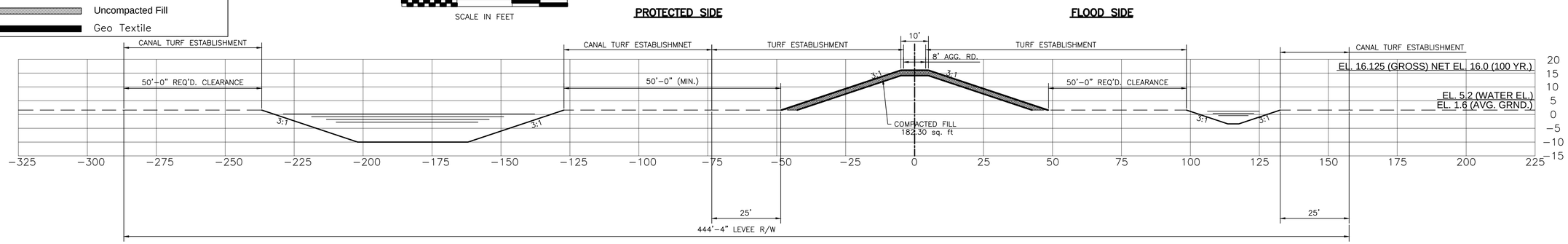
Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

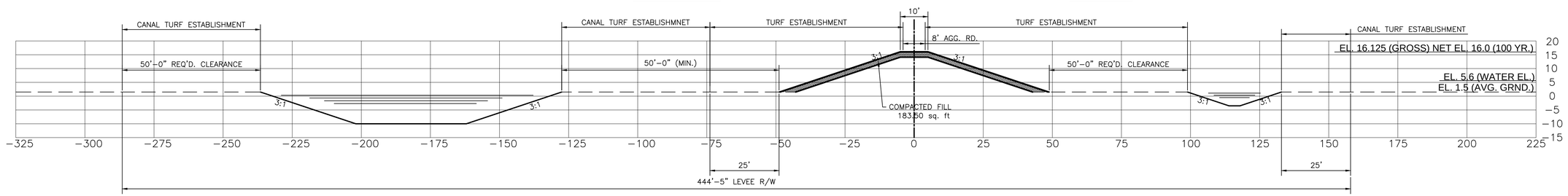
1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40
SCALE IN FEET



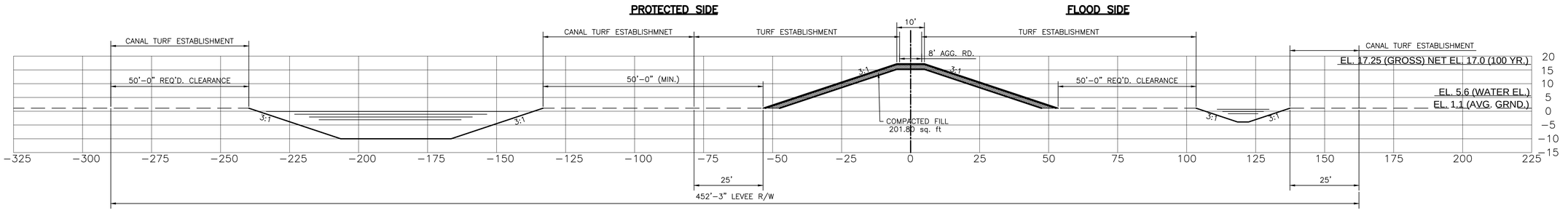
Levee Section C−21 (Sta. 945+00.00 thru Sta. 967+91.21)

First Lift



Levee Section C−20 (Sta. 905+00.00 thru Sta. 945+00.00)

First Lift



Levee Section C−19 (Sta. 850+00.00 thru Sta. 905+00.00)

First Lift

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER C6.6

ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE FLANS | Alignment C

BKI
MA GSA

DESIGNED / CHECKED	DETAILED / CHECKED	DATE / SHEET
DEB/TNP / HMP	GAD / DEB/TNP	03/2014 / 44 OF 45

NO.	DATE	REVISION DESCRIPTION	BY

Legend

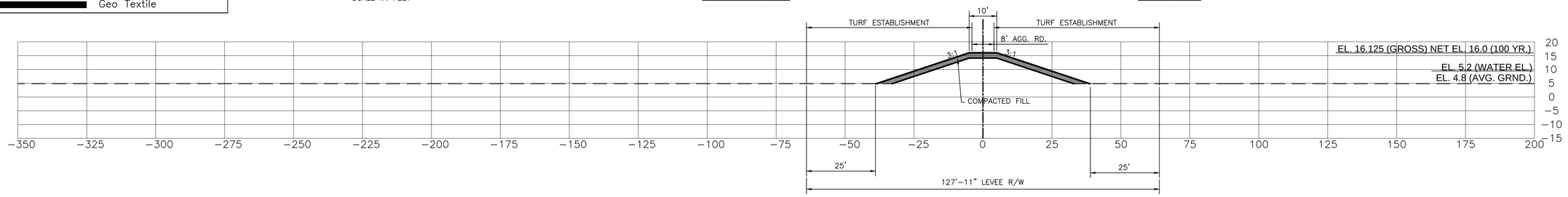
- Center Line of Levee
- Toe of Levee
- Compacted Fill (Overbuild)
- Compacted Fill
- Uncompacted Fill
- Geo Textile

GENERAL NOTES:

1. 3:1 SIDE SLOPES
2. 100% IMPORTED CLAY
3. CONVEYANCE CANAL DEPTH TO −10' NAVD88

20 0 20 40

SCALE IN FEET



Levee Section C−22 (Sta. 967+91.21 thru Sta. 1063+87.55)

First Lift

FILE NAME: X.DWG DATE: XREF: NONE

SHEET NUMBER	C6.7

ST. CH-RLES / ST. JOHN THE B-PTIST
ST. J-MES / -SCENSION P-RISHES

P-RISH | PLD PROJECT | US-ACE PROJECT

WEST SHORE – L-KE PONTCH-RTR-IN, L-
HURRIC-NE PROTECTION PROJECT
P-RISHES OF ST. CH-RLES, ST. JOHN THE B-PTIST, ST. J-MES, -ND -SCENSION

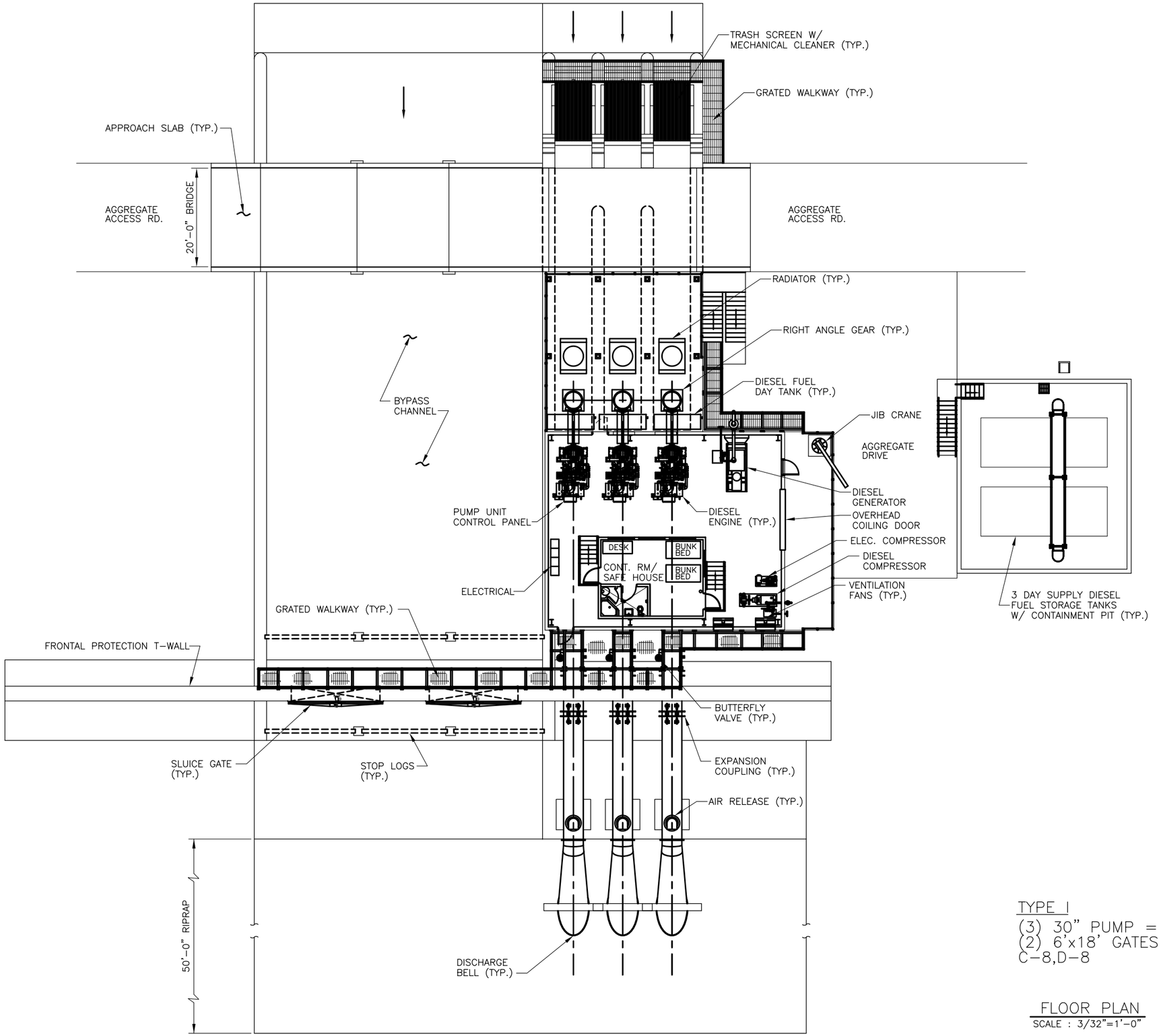
LEVEE FL-NS | Alignment C

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DET-ILED	GAD
CHECKED	DEB/TNP
D-TE	03/2014
SHEET	45 OF 45

NO.	REVISION DESCRIPTION	D-TE	BY

PUMP STATION FLOOR PLANS AND ELEVATION VIEWS



TYPE I
(3) 30" PUMP = 200 CFS
(2) 6'x18' GATES
C-8,D-8

FLOOR PLAN
SCALE : 3/32"=1'-0"

SHEET NUMBER M1.0

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST
ST. JAMES / ASCENSION PARISHES
PLD PROJECT
USACE PROJECT

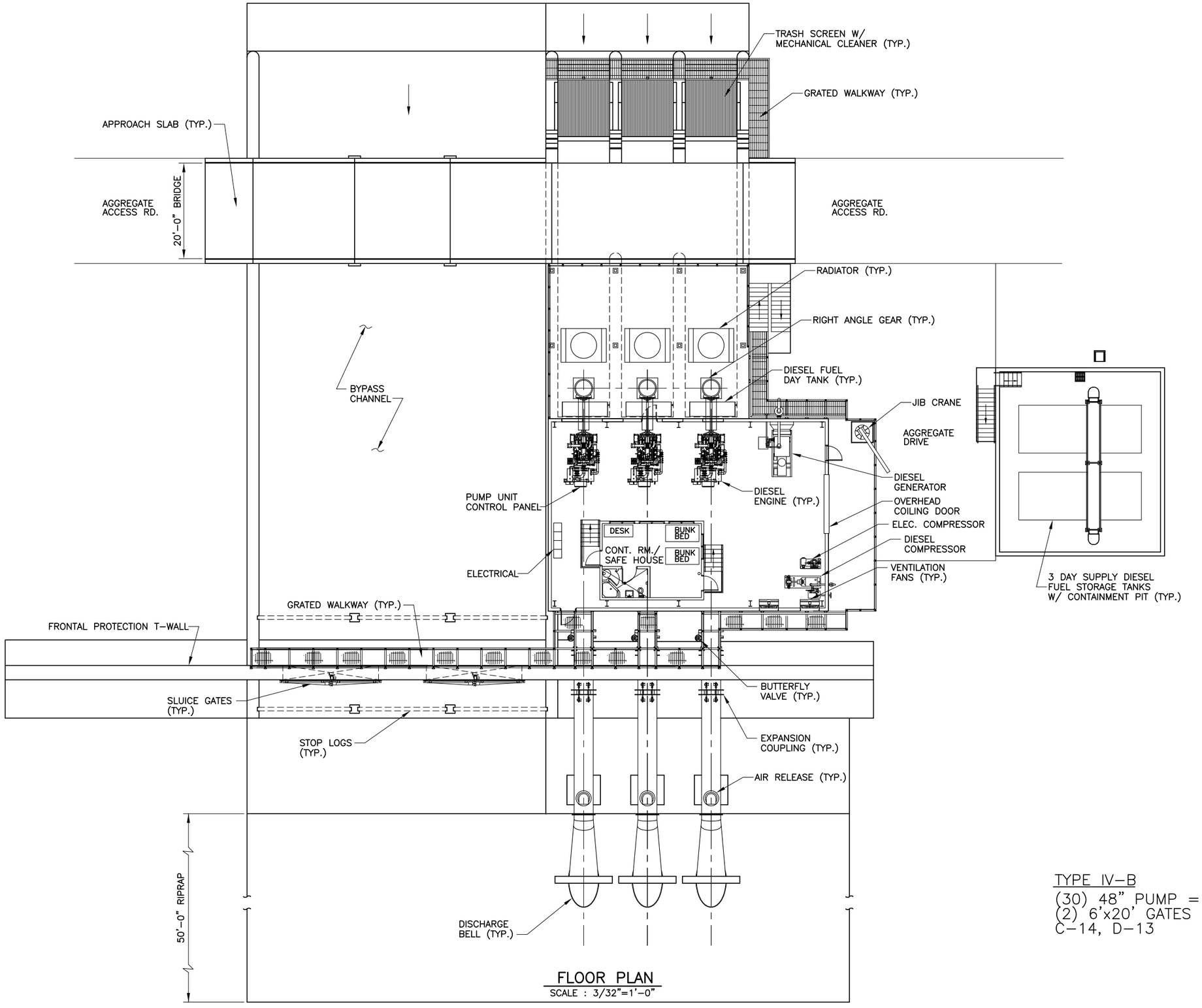
WEST SHORE - LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION
DGE PLANS
FLOOR PLAN

BKI
MA GSA

DESIGNED DEB/TNP
CHECKED HMP
DETAILED GAD
CHECKED DEB/TNP
DATE 12/2012
SHEET 1 OF 13

NO.	DATE	REVISION DESCRIPTION	BY

FILE NAME: X.DWG
DATE:
XREF: NONE



FLOOR PLAN
SCALE : 3/32"=1'-0"

TYPE IV-B
(30) 48" PUMP = 400 CFS
(2) 6'x20' GATES
C-14, D-13

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER	M1.4
PARISH	ST. CHARLES / ST. JOHN THE BAPTIST ST. JAMES / ASCENSION PARISHES
PLD PROJECT	
USACE PROJECT	

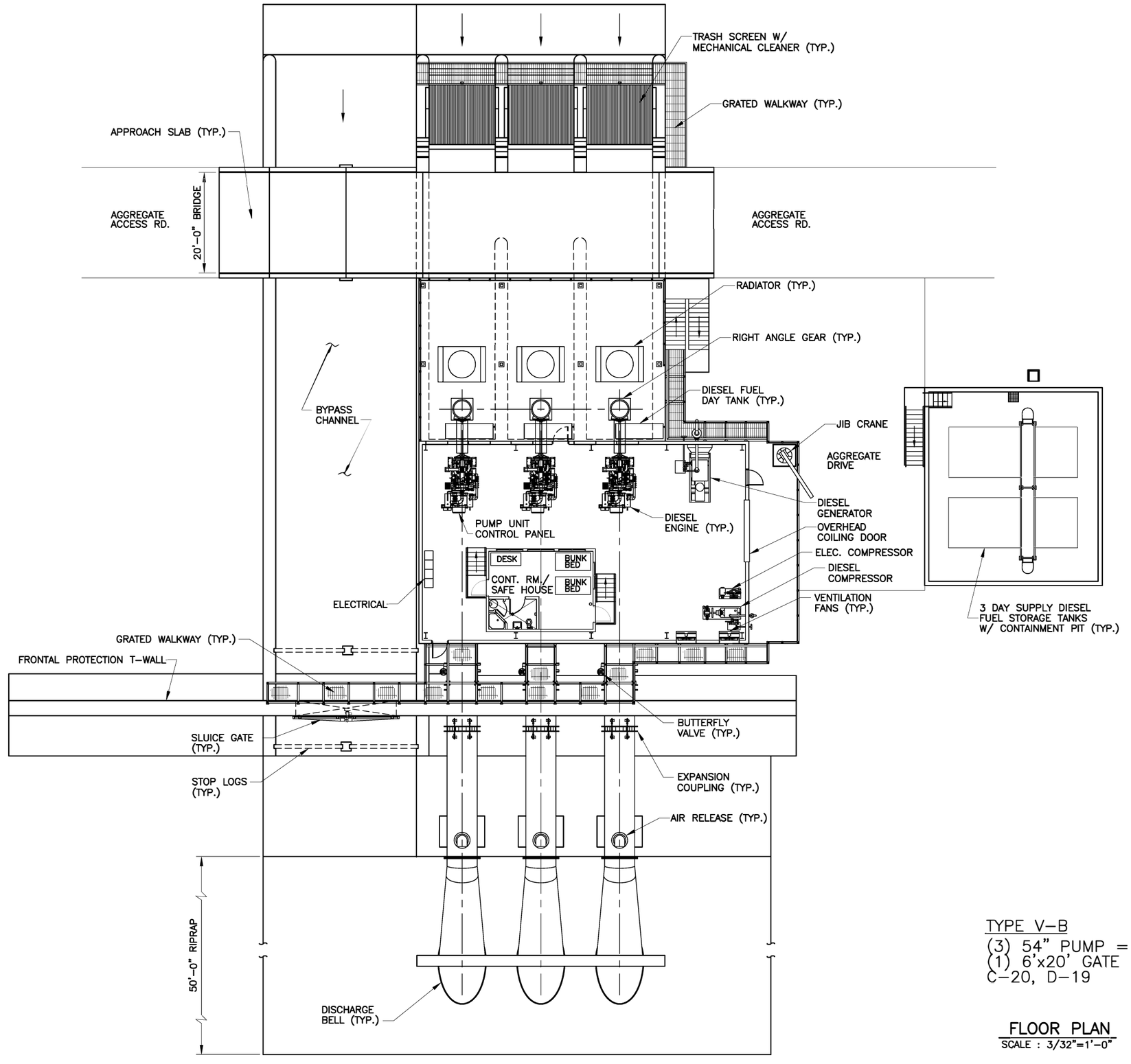
WEST SHORE - LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS: FLOOR PLAN

BKI
MA GSA

DESIGNED	DEB/TNP	DETAILED	GAD
CHECKED	HMP	CHECKED	DEB/TNP
DATE	12/2012	SHEET	5 OF 13

NO.	REVISION DESCRIPTION	DATE	BY



TYPE V-B
(3) 54" PUMP = 460 CFS
(1) 6'x20' GATE
C-20, D-19

FLOOR PLAN
SCALE : 3/32"=1'-0"

SHEET NUMBER M1.6

ST. CHARLES / ST. JOHN THE BAPTIST
ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

WEST SHORE - LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

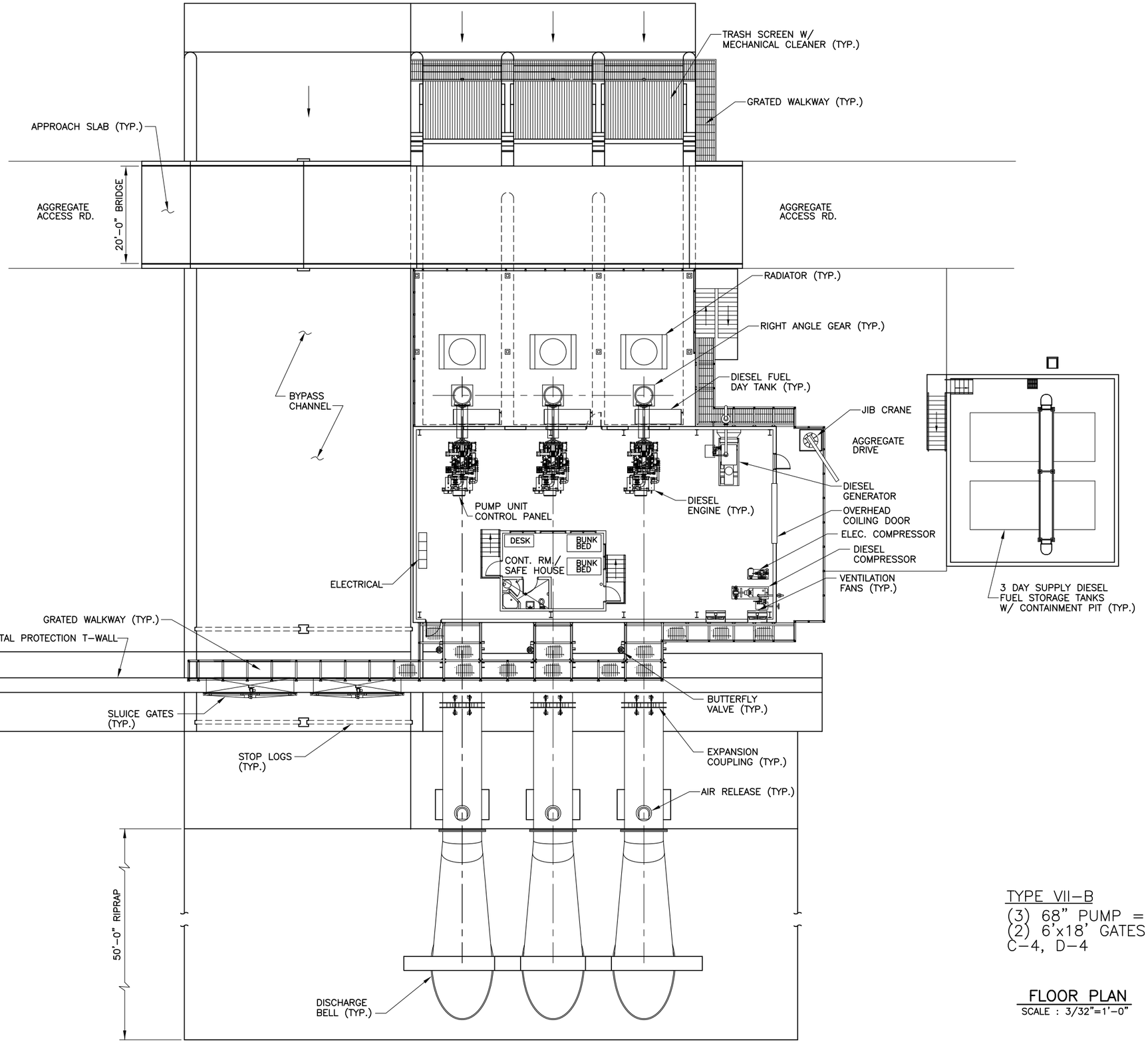
LEVEE PLANS | FLOOR PLAN

BKI
MA GSA

DESIGNED DEB/TNP | DETAILED GAD | DATE 12/2012
CHECKED HMP | CHECKED DEB/TNP | SHEET 7 OF 13

NO. | DATE | REVISION DESCRIPTION | BY

XREF: NONE
DATE:
FILE NAME: X.DWG



TYPE VII-B
(3) 68" PUMP = 1100 CFS
(2) 6'x18' GATES
C-4, D-4

FLOOR PLAN
SCALE : 3/32"=1'-0"

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER M1.9

ST. CHARLES / ST. JOHN THE BAPTIST ST. JAMES / ASCENSION PARISHES

PARISH | PLD PROJECT | USACE PROJECT

SOUTH LAKE PONTCHARTRAIN HURRICANE PROTECTION DISTRICT

WEST SHORE - LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

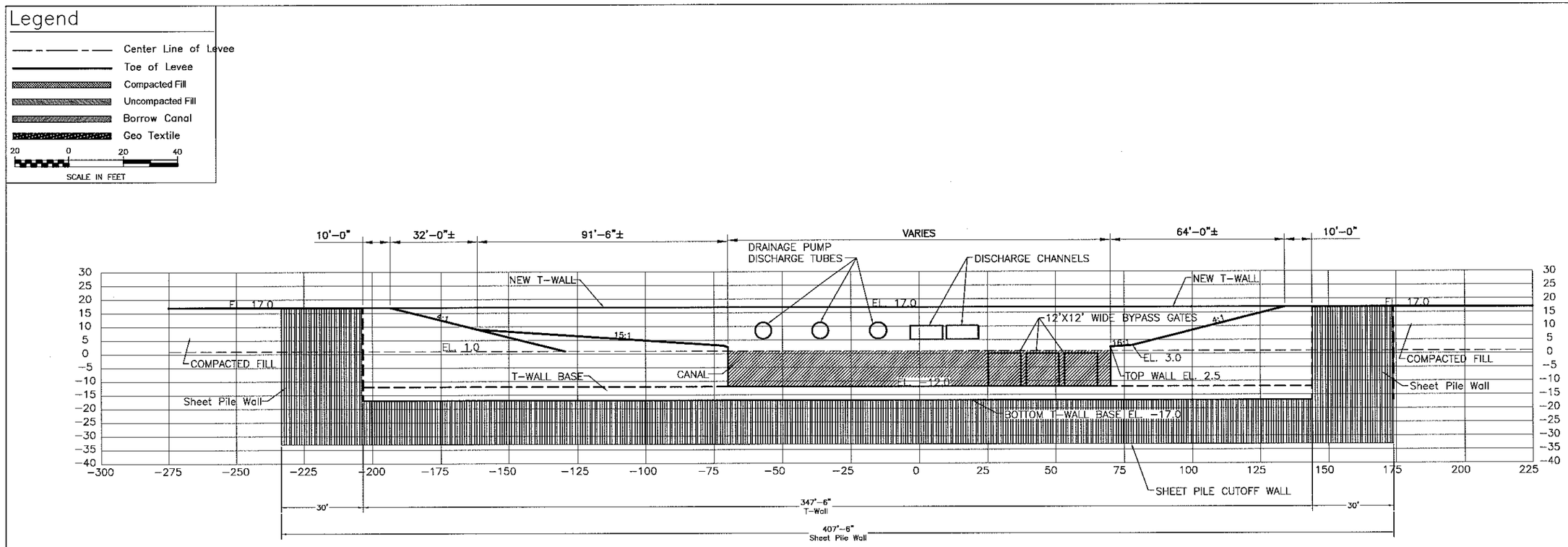
LEVEE PLANS | FLOOR PLAN

STATE OF LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

BKI
MA GSA

DESIGNED	DEB/TNP	DETAILED	GAD	DATE	12/2012
CHECKED	HMP	CHECKED	DEB/TNP	SHEET	10 OF 13

NO.	REVISION DESCRIPTION	BY	DATE



ELEVATION OF T–WALL @ PUMP STATION

NOTE:

NUMBER AND SIZE OF PUMP DISCHARGE TUBES, DISCHARGE CHANNELS, AND BYPASS GATES VARIES EACH PUMP STATION LOCATION.

ELEVATION SHOWN FOR TYPICAL FRONTAL PROTECTION T–WALL PLACEMENT. WIDTH VARIES PER PUMP STATION LOCATION.

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER S1.0

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST ST. JAMES / ASCENSION PARISHES

FED. PROJECT

USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS

ELEVATION VIEW PUMP STATION

BKI
MA GSA

DESIGNED	DEB/TNP	DATE	12/2013
CHECKED	HMP	SHEET	1 OF 4
DETAILED	GAD		
CHECKED	DEB/TNP		

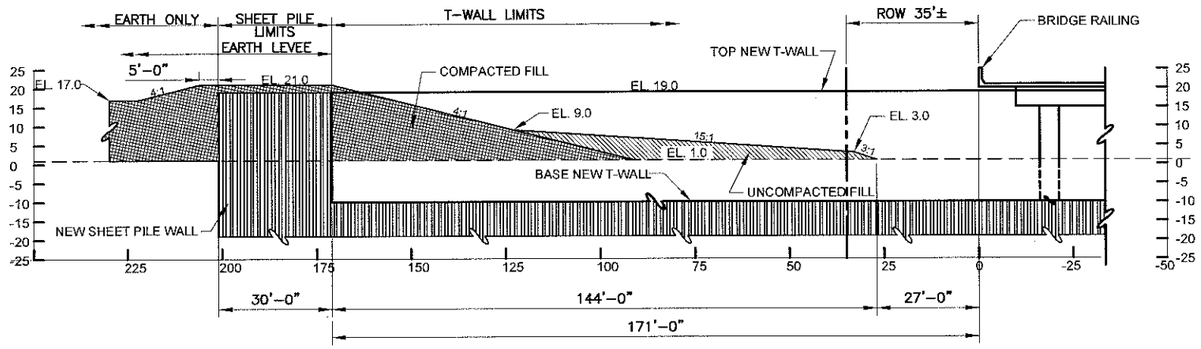
NO.	REVISION DESCRIPTION	DATE	BY

Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill
- Uncompacted Fill
- Borrow Canal
- Geo Textile

20 0 20 40

SCALE IN FEET



INTERSTATE T-WALL TYPICAL TRANSITION

NOTE:

LEFT HAND VIEW SHOWN. RIGHT HAND VIEW SYMMETRICAL ABOUT INTERSTATE CENTERLINE (SAME BUT OPPOSITE HAND)

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER S1.1

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

FLD PROJECT

USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS

INTERSTATE T-WALL TYPICAL SECTION

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	CAD
CHECKED	DEB/TNP
DATE	12/2013
SHEET	2 OF 4

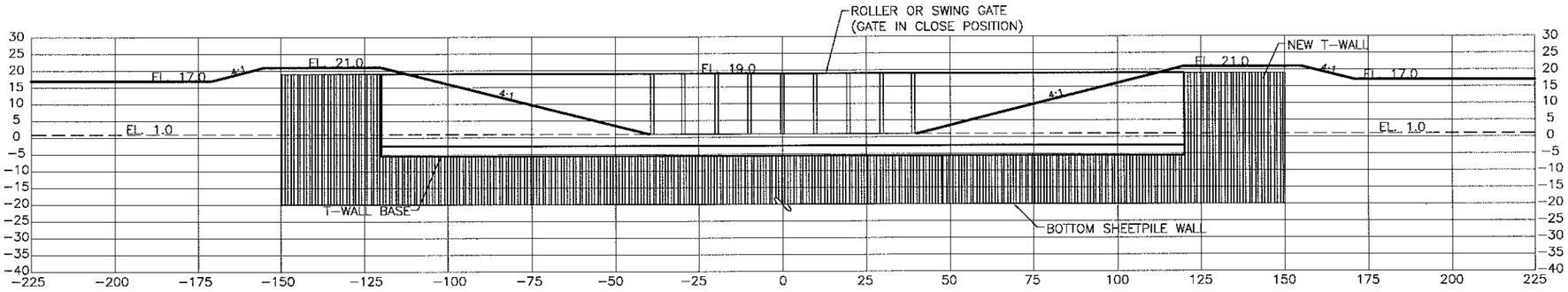
NO.	DATE	REVISION DESCRIPTION	BY

Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill
- Uncompacted Fill
- Borrow Canal
- Geo Textile

20 0 20 40

SCALE IN FEET



ELEVATION VIEW FLOODGATE @ ROADWAY/RAILROAD

NOTE:

GATE WIDTH VARIES FOR INDIVIDUAL CROSSINGS.

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER S1.2

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

PJD PROJECT

USACE PROJECT

WEST SHORE – LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS: FLOODGATE TYPICAL SECTION

BKI
MA GSA

DESIGNED	DEB/TNP	DETAILED	GAD	DATE	12/2013
CHECKED	HMP	CHECKED	DEB/TNP	SHEET	3 OF 4

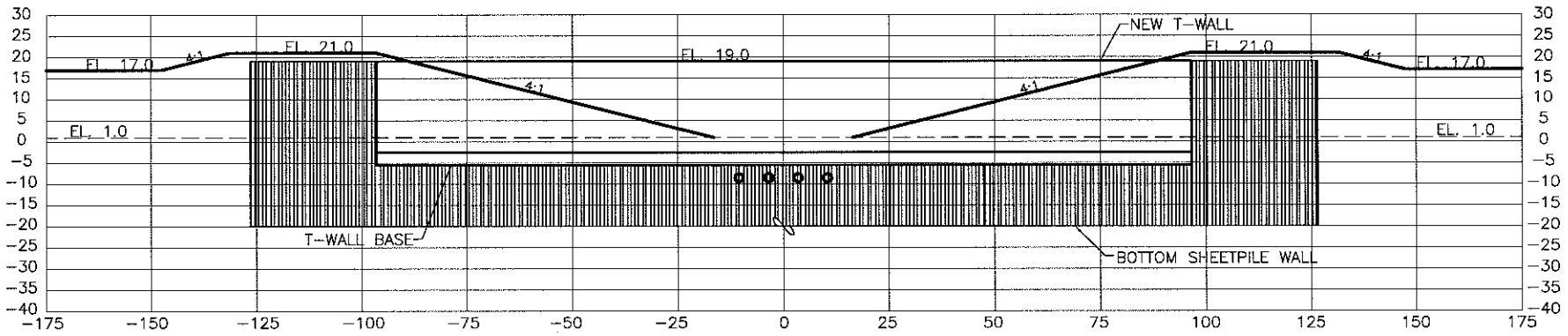
NO.	DATE	REVISION DESCRIPTION	BY

Legend

- Center Line of Levee
- Toe of Levee
- Compacted Fill
- Uncompacted Fill
- Borrow Canal
- Geo Textile

20 0 20 40

SCALE IN FEET



PIPELINE T-WALL CROSSING TYPICAL ELEVATION

NOTE:
NUMBER OF PIPELINES VARY AT INDIVIDUAL CROSSINGS.

XREF: NONE

DATE:

FILE NAME: X.DWG

SHEET NUMBER S1.3

PARISH: ST. CHARLES / ST. JOHN THE BAPTIST / ST. JAMES / ASCENSION PARISHES

FED PROJECT

USACE PROJECT

WEST SHORE - LAKE PONTCHARTRAIN, LA
HURRICANE PROTECTION PROJECT
PARISHES OF ST. CHARLES, ST. JOHN THE BAPTIST, ST. JAMES, AND ASCENSION

LEVEE PLANS

PIPELINE CROSSING TYPICAL SECTION

BKI
MA GSA

DESIGNED	DEB/TNP
CHECKED	HMP
DETAILED	CAD
CHECKED	DEB/TNP
DATE	12/2013
SHEET	4 OF 4

NO.	DATE	REVISION DESCRIPTION	BY

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

ENGINEERING
APPENDIX B

Table of Contents

General.....2
Levee System..... 4
Localized Storm Surge Risk Reduction Measures.....7
Hydraulics and Hydrology.....10
Interior Modeling Methodology (Without-Project and With-Project - Alignment C).....10
Hydrology.....10
Hydraulics.....16
Results and Evaluation.....18
Exterior Storm Surge Modeling.....21
Wave Conditions.....30
Levee Design.....32
Results.....35
Sub-planning Stage Frequency.....37
Induced Flooding.....38
Geotechnical.....40
Background and Furnished Information.....40
Application of Soil Design Reaches.....41
Revised Analyses and Modified Recommendations.....41
Additional Considerations.....42
Datum and Topography.....42
Civil / Structural Design.....42
Access Routes and Staging Areas.....42
Borrow Sources.....43
Quantities.....43
Relocations.....43
Cost Estimates.....44
References.....44
Screening Phase (Background) Information.....46
ANNEXES
Annex 1 Cost Engineering Report, MII Estimate, Construction Schedule and Summary CSRA
Annex 2 Detailed CSRA
Annex 3 Final Drawings (Recommended Plan----------Alignment C)

General

The Study area is located west of the Bonnet Carre Spillway between the Mississippi River and Lakes Pontchartrain and Maurepas in Southeast Louisiana. The project's purpose is to provide hurricane and storm damage risk reduction to developed areas of St. Charles, St. John the Baptist and St. James Parishes. Three structural levee alignments (Levee Alignments A, C and D) were evaluated (each with several features, including levees, floodwalls, floodgates and pumping stations) in order to select the best approach to reduce hurricane/tropical storm surge

(hereafter “storm surge”) in communities throughout the study area. Each alternative also evaluated environmental measures designed to protect and/or minimize the impacts to nearby wetlands and transportation evacuation routes (such as I-10 and U.S. 61) located in the study area. More information on the alternatives that were considered can be found in the **Screening Phase (Background) Information** section of this Appendix.

Information provided herein describes the details of the Levee System of the Recommended Plan (drawings of the alignment, known as Alignment C, can be found in Annex 3 of this Appendix). Details on the final design of the localized storm surge risk reduction system are incorporated into Chapter 5 of the main report and at the end of the Plan Formulation Appendix. The Recommended Plan is based on modeling for a 100-year level of risk reduction in the Baseline Year of 2020. This is also known as the base year and is part of a 50 year planning horizon that is generally used for U. S. Army Corps of Engineers (USACE) projects. The year 2020 was decided as the base year for economic and hydraulic conditions since it is possible that the proposed levee could be designed and constructed by then with sufficient funding and authorization.

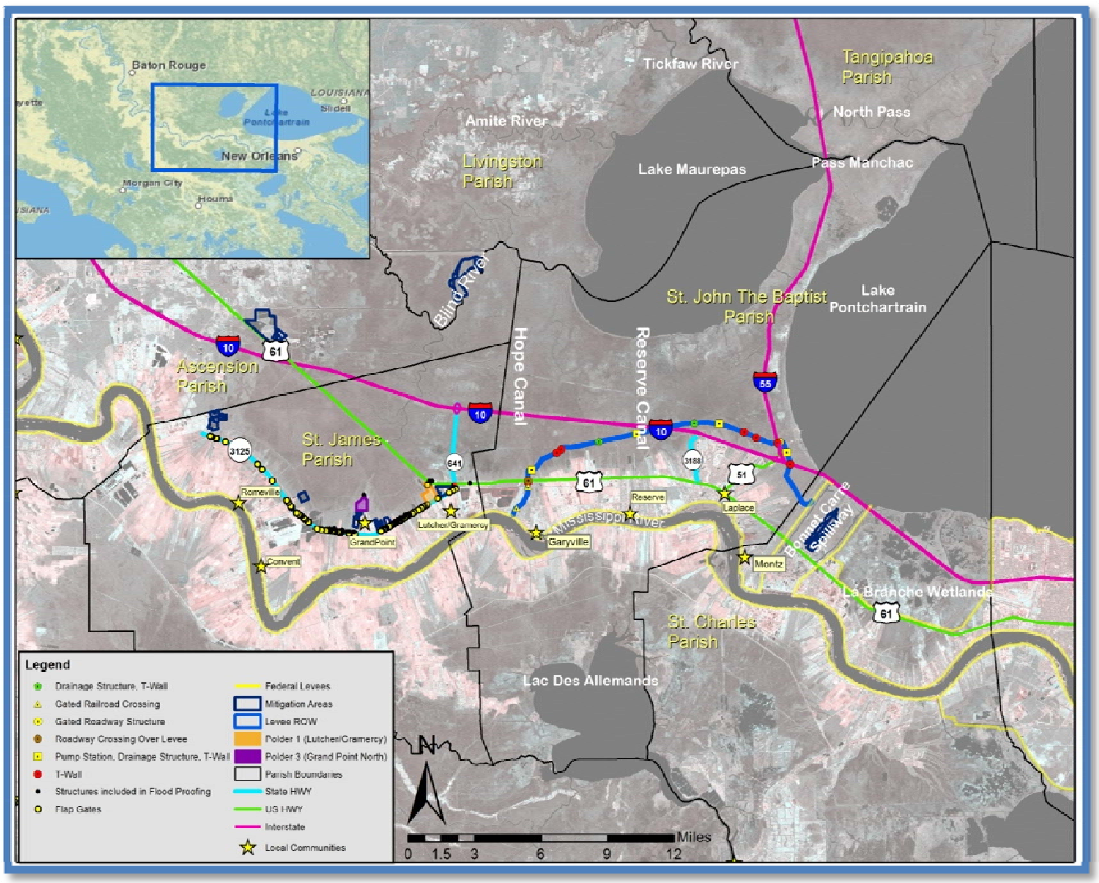


Figure 1: Overview of Risk Reduction System (Alignment C)

The Recommended Plan (known as Alignment C) for the West Shore-Lake Pontchartrain (WSLP) study includes the construction of an 18.27-mile (96,500 ft) levee system around the communities of Montz, LaPlace, Reserve and Garyville. This system also includes the construction of localized storm surge risk reduction measures in St. James Parish. An overview of the entire risk reduction system is shown in Figure 1.

Levee System

The levee system would begin at the upper guide levee of the Bonnet Carre Spillway, north of an underground utility pipeline right of way and US-61. The levee would head northwest paralleling the pipeline right of way and pass under I-10. Past I-10, the levee would enclose the I-10 and I-55 interchange and cross US-51. It would then track north of I-10 and a pipeline transmission corridor. Past the Belle Terre/I-10 exit, the levee would pass back under I-10 and parallel the pipeline corridor through wetlands until it crosses Hope Canal. The levee would then turn south; cross the pipeline transmission corridor and then extend to the Mississippi River Levee System (MRL)

The levee system would reduce the risk of flooding for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 could allow for an earlier re-entry route for residents and emergency responders in southeast Louisiana, including residents in the New Orleans metropolitan area.

The construction of the structural component of the project, hereafter referred to as the "levee system", would be based on a 1% probability storm level of risk reduction and a 2020 intermediate RSLR condition. In order to maintain the 1% probability storm level of risk reduction system over the period of evaluation (50 years) the levee system would include future levee lifts based on the 2070 intermediate RSLR conditions. For example, at the starting point of the upper guide levee of the Bonnet Carre Spillway the levee would be constructed to a top of levee elevation of 15 ft. NAVD88 in 2020. In the future, the levee at this point would be lifted to a final elevation of 19.5 ft. NAVD88 based on the 2070 intermediate RSLR conditions. This is the highest elevation point of the constructed levee system. The levee would start at this height and taper down to a final top levee elevation of 8.5 ft. NAVD88 near the MRL. The final 2070 top levee elevation near the MRL would be 16 ft. NAVD88.

The system would consist of earthen levees, floodwalls (T-Walls), floodgates, drainage canals, a flood-side ditch for hydraulic connectivity for wetlands north and south of the system, drainage structures and pump stations along the alignment, and mitigation measures (Figure 5-2). Structures through the levee would be built to the 2070 intermediate RSLR condition, to prevent costly future retrofits required for anticipated changing sea levels.

Starting at the upper guide levee of the Bonnet Carre Spillway and heading west along the levee, the project would construct a 646 linear foot (hereafter "LF") T-Wall to pass under the existing I-10 overpass. Past this point, an 1,100 cubic feet per second (cfs) pump station with three 68" outfalls would be built at Montz Canal, which is very near the I-55 northbound entrance ramp. The pump station, when the system is closed, would mainly remove rainwater flows from the Woodland, the River Forest and the Prescott Canals. A 267 LF T-Wall and two 6' x 18' x 27' gated drainage structures would also be constructed at this location. This location and all locations with pump stations or drainage structures would be connected to a flood side ditch and a protected side canal that would parallel the entire levee length. The canals would be used to maintain the existing connection between swamps located inside and outside of the levee system. The protected side canal would also serve as a redundancy connection if one of the pump stations failed during an event.

Past the Montz Canal, at the location of US-51, a 188 LF gated structure would be placed through the levee. Directly west of US-51, a 247 LF T-Wall would cross under I-55. The levee would continue to the west until the levee intercepts the first pipeline crossings near Vicknair Canal. Two sections of T-Walls would be used for these pipeline crossing, a 550 LF T-Wall, and a 623 LF T-Wall. Half of the 35 required pipeline relocations would be at these two locations. For purposes of this report, it is expected that all of the pipeline relocations would be

compensable. Relocations are expected to take place in the proposed levee right-of-way (ROW) or existing pipeline ROW. Determination of the compensability of these relocations will be determined during the engineering and design phase of this project if it is authorized.

Continuing west, the levee would then cross Ridgefield Canal. Ridgefield Canal is located between the I-10 Louisiana Department of Transportation and Development (LADOTD) weigh station and the I-10/LA 3188 exit. A 200 cfs pump station with three 30" outfalls would be built at Ridgefield Canal. The pump station, when the system is closed, would mainly remove rainfall flows from Laplace Plantation, Perriloux, Ridgefield, Tebo and Vicknair canals. A 244 LF T-Wall with two 6' x 18' x 267' gated drainage structures would also be constructed at this location.

West of the Ridgefield Canal, a 100 LF floodgate would be constructed at the location of the Perriloux Canal to allow rainfall flows to flow through the levee when the system is not closed.

West of the I-10/LA 3188 exit, a 247 LF T-Wall would be constructed to cross back under I-10. The levee would continue to parallel the pipeline corridor through wetlands until it reaches Reserve canal. A 400 cfs pump station with three 48" outfalls would be built at this location. The structures at this location would also include two 6' x 20' x 25' drainage structures with a boat bay and 335 LF of T-Walls. Small boats would still be able to pass through the drainage structure when the system is open.

Continuing west, the levee would then cross Mississippi Bayou. A 6' x 10' x 25' drainage structure with a 267 LF T-Wall would be constructed at this location.

The levee would then continue west toward Hope Canal, until it reaches the next major set of pipeline crossings. All of the remaining major pipeline relocations would be at this location. Two sections of T-Walls would be used for these pipeline crossings: a 400 LF T-Wall and a 300 LF T-Wall. As with the other pipelines, for purposes of this report, it is expected that the pipeline relocations would be compensable. Relocations are expected to take place in the proposed levee ROW or existing pipeline ROW at this location. Determination of the compensability of these relocations will be determined during the engineering and design phase of this project if it is authorized.

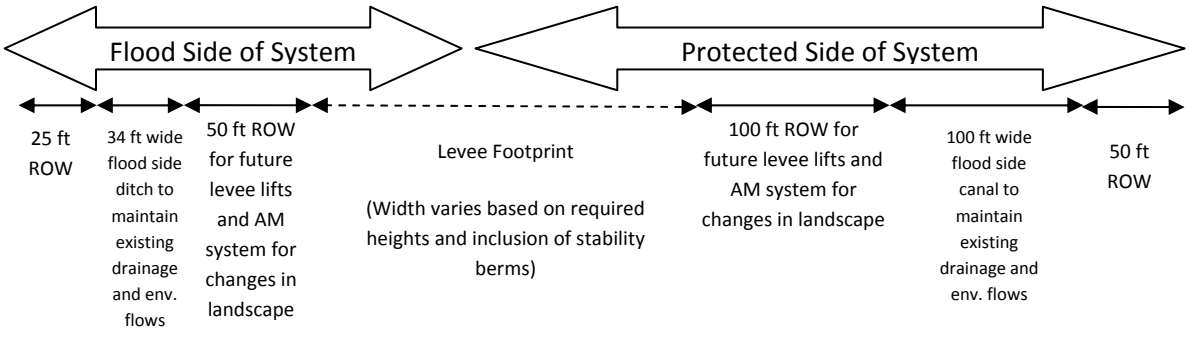
The levee would then continue west until it reaches Hope Canal. A 450 cfs pump station with three 54" outfalls would be constructed at this location. Currently, the design and cost includes a 6' x 20' x 25' drainage structure and a 247 LF T-Wall, but the Hope Canal location is also the same location of the State of Louisiana's proposed Mississippi Reintroduction into Maurepas Swamp diversion. The WSLP project has been coordinating activities between the project development teams, but for the purposes of the WSLP feasibility design, we do not consider the diversion project as a future landscape feature, since the State has not identified funding and has filed an incomplete permit application to USACE for construction of the project. USACE would continue to monitor the status of the diversion project. The team expects that if the diversion project moves forward it would be constructed on the flood side of the levee and would parallel the levee from Hope Canal to the MRL.

When the levee turns south, past Hope Canal to tie into the MRL, the levee would cross US-61, a pipeline ROW, and two railroad tracks. US-61 would be raised to hump over the levee at the crossing point. The pipeline crossing would include a 301 LF T-Wall, while the two railroad crossings would include a 150 LF gate structure and a 50 LF gate structure.

In all, there would be a total of 5,001 LF of T-Walls, 4 pump stations with associated drainage structures, 2 drainage structures, one gated road crossing, and 2 gated railroad crossings.

4.69 miles of the upper guide levee of the Bonnet Carre Spillway from the spillway control structure to the WSLP tie-in point would be included in the WSLP levee system, but there would be no construction activities associated with this Bonnet Carre levee. Existing levee heights are high enough to prevent 1% probability storm surge from entering the WSLP system during storms. The construction of the WSLP tie-in point would be to set to elevation of 15 ft. NAVD88 while the current upper guide levee elevation is 15.5 ft. NAVD88. The upper guide levee heights in the future would be monitored to determine if sections of the Bonnet Carre Spillway levee would need future lifts to prevent overtopping of storm surges into the WSLP system.

All levee right-of-ways would have the following typical dimensions:



The 50-ft. and 100-ft. rights-of-way adjacent to the levee footprints would be used for future levee lifts. The levee would be lifted five times over the period of evaluation. The first two lifts would be used to obtain a 1% probability storm level of risk reduction system in 2020. Additional levee lifts to maintain a 1% probability storm level of risk reduction system would take place in years 2030, 2045 and in 2060.

9,000,000 cubic yards (cy) of compacted fill and un-compacted fill would be required to create and maintain the levee over the period of evaluation. A portion of the initial fill material, if suitable, would be obtained from the canals and ditch, approximately 1,678,000 cy. Borings indicate that the top 4 ft of the cross section of these features would not be suitable as levee fill material. The top 4 ft of material; approximately 1,685,000 cy, would be used beneficially at mitigation plan sites, or disposed of appropriately by the contractor. The remaining fill for the levee, approximately 7,322,000 cy, would be obtained from the Bonnet Carre Spillway.

The levee footprint would vary based on the designed cross section and required top of levee heights by each levee section. The top of the levee would have a 10' wide crown and the protected side of the levee system would be based on a 1:3 side slope, with some reaches including a geotechnical stability berm. 3,400,000 square yards of geotextile fabric would be placed under the levee footprint and approximately 80,000 cubic yards of aggregate limestone would be used to build a road on the levee crown.

The total levee construction ROW would be 1,235 acres. Real Estate agreements would be acquired on all features. A perpetual flood protection levee easement would be acquired for the 669 acres of the levee and floodwall features. A perpetual flood protection levee easement would be acquired for the 33 acres of the T-Walls. For the two canals, a 519-acre perpetual drainage ditch easement would be acquired. For the remaining features, the 4 pump stations would require 9 acres and the 3 gated crossings would require 5 acres (to be acquired based on fee, excluding minerals). In addition to the permanent easements, 49 acres of temporary access easements and 12 acres of temporary work area easements would be acquired. These

temporary access and work access areas would be on existing roadways or developed areas of the project area and would not be in environmentally sensitive areas.

All of the impacts from the constructed features would be to either swamp habitats or Bottom Land Hardwood (BLH). There would be a direct removal of 1,112 acres of swamp habitats and 123 acres of BLH habitats. Using a wetland value assessment (WVA) under the intermediate sea level rise scenario the project would be required to mitigate for a direct loss of 595.3 average annual habitat units (AAHUs) of swamp and 95.5 AAHUs of BLH. In addition to the direct removal of acres of habitat due to construction, the project would enclose 8,432 acres of swamp and 89 acres of BLH.

Hydrologic connectivity would be maintained to the extent practicable through water control structures except during closure for hurricanes or tropical storms. When the system is closed, pumps would operate on average for 1.7 storms per year, which equates to a closure of structures on average 8.5 days per year. This expected rate of closure would be the same regardless of the actual rate of RSLR as closure of the system is tied to tropical storm events and the elevation trigger would be adjusted as sea level rises. The risk reduction system is only authorized to address storm surge caused by hurricane and tropical storm events. It is not authorized to mitigate for or reduce impacts caused by higher day-to-day water levels brought about by increases in sea level rise alone. Any operational changes implemented to address changing SLR conditions or for any other non-project-related purpose would be considered a separate project purpose requiring separate authorization, new NEPA documentation, and / or permit approvals.

The levee is designed to maintain hydrologic connectivity to the extent practicable. In order to minimize a reduction in efficiency of drainage affecting water quality and increased impoundment on the protected side of the system, the levee design includes drainage structures and canals located on both the flood side and protected side of the levee. In order to mitigate for any impacts caused by the potential delay in water movement, the team developed a WVA that accounts for delays in water movement. Because 366 acres of the total 455 acres of enclosed BLH is already impacted by existing roadways and railroad tracks, the BLH indirect impacts were calculated to total 89 acres. Using a WVA under the intermediate RSLR scenario, the project would have to mitigate for the indirect loss of 494.5 AAHUs of swamp and 3.1 AAHUs of BLH. The project would also be required to mitigate for a direct loss of 595.3 AAHUs of swamp and 95.5 AAHUs of BLH. The total required mitigation for both the direct and indirect impacts from the construction of the risk reduction levee system is 1,188.03 AAHUs.

Localized Storm Surge Risk Reduction Measures

The Recommended Plan includes localized storm surge risk reduction measures for structures in the communities of Gramercy, Lutcher and Grand Point, which are located outside of the proposed levee system (Figure 5-2). These localized storm surge risk reduction measures focused on addressing existing damages in St. James Parish, while still being economically justified and environmentally compliant. See Chapter 3.9 and Appendix E for information concerning plan formulation and design of the localized storm surge risk reduction measures. These measures include berms and flapgates on existing drainage and roadway features. Floodproofing measures (e.g., raising of certain residential structures and construction of smaller berms around certain individual non-residential structures) are limited to a few structures located outside of the larger localized storm surge risk reduction measures. All of the measures focus on providing a risk reduction above the 1% probability storm stages in Year 2020. The Non-Federal Sponsor (NFS) will be required to maintain these features to their initially-constructed design height for as long as the project remains authorized. The future level of risk reduction is dependent on the actual rate of RSLR.

Gramercy Area

In the Gramercy and Lutcher area, north of LA Hwy. 3125, a 10,100 LF berm would be built to provide risk reduction to 275 structures, herein referred to as "**Polder 1 (Gramercy Berm)**." The berm would be constructed to a 6.5' NAVD88 elevation. The berm in Year 2020 would provide risk reduction above the 1% probability storm stages. Storm stages in St. James Parish are below +6.5' NAVD88 elevation in Year 2020. As discussed in Chapter 3, in the future, the berm's effectiveness depends on the actual rate of RSLR.

The berm would parallel both sides of LA Hwy. 20, and parallel the railroad track along US-61 (Airline Highway). To the south, the berm would tie into LA Hwy. 3125 to close off the system. LA Hwy. 3125 is key feature for all of the localized storm surge risk reduction features. The entire roadway is above 6.5' NAVD88 elevation and will be used as a tie-in point for the berm. The design of the berm is based on a 4' wide crown and 3:1 side slopes. Using local Light Detection and Ranging (LiDAR) data, it was assumed that the existing ground elevation under the berm would be at an elevation of approximately 4.3' NAVD88. Using this assumption, the proposed berm would have an average height of 2.2' with an average width of 18', and require 237,000 cy of compacted fill for construction. The berm would also include two floodgates to allow existing drainage to flow through the berm when not under surge events. A pump system to operate and remove rainwater during tropical / hurricane storm events will be included in the features. The pump system will be approximately 217 cfs. The berm would be placed in a location so as not to interfere with existing local drainage.

In reviewing the berm footprint, there is a risk of affecting approximately 0.29 acres of forested wetlands. Attempts would be made to avoid these areas during construction. Due to the current uncertainty in avoiding these areas, we have included costs for mitigating for these forested wetlands in the total construction cost.

Grand Point Area

In the Grand Point area, north of LA Hwy. 3125, the Recommended Plan includes one berm, "**Polder3 (Grand Point North**)". Polder3 (Grand Point North) would provide risk reduction to 71 structures. The berm would be a complete ring around the structures in the northern portion of Grand Point, near the Grand Point Boat Launch. The berm would be 10,400 LF, and would include a 4' wide crown and 3:1 side slopes. The berm would be constructed to a 6.5' NAVD88 elevation. Initially, in Year 2020, the berm would provide risk reduction above the 1% probability storm stages. Storm stages in St. James Parish are below a 6.5' NAVD88 elevation in Year 2020. Future level of risk reduction is dependent on the actual rate of RSLR.

Using local LiDAR data, it was assumed that the existing ground elevation under the berm would be approximately 4' NAVD88. Using this assumption, the proposed berm would have an average height of 2.5' with an average width of 20', and require 286,800 cy of compacted fill for construction. The berm would also include one floodgate to allow existing drainage to flow through the berm when not under surge events. A pump system to operate and remove rain water during tropical / hurricane storm events will be included in the features. The pump system will be approximately 140 cfs. The berm would be placed in a location so as not to interfere with existing local drainage. The berm would also be placed very near the edge of the property owners' parcels where feasible. This would minimize the loss of use of any property.

In reviewing the berm footprint, there is a risk of affecting approximately 0.81 acres of forested wetlands. Attempts would be made to avoid these areas during construction. Due to the

current uncertainty in avoiding these areas, we have included costs for mitigating for these forested wetlands in the total construction cost.

Flood Risk Reduction Under LA Highway 3125

In addition to the berms north of LA Hwy. 3125, the Recommended Plan is to use 13 miles of LA Hwy. 3125 and its existing foundation as a localized storm surge risk reduction feature. Currently, the roadway elevation is above 6.5' NAVD88 in elevation. At present, the 1% probability storm stages in Year 2020 flow through the culverts under the roadway in the opposite direction from natural drainage. By closing off the culverts with one-way flap gates and a drainage canal with a floodgate during surge events, the plan would provide risk reduction to 19,500 acres and 4,295 structures south of LA Hwy. 3125. Although there are a limited number of structures that are impacted by the 1% probability storm stages, this closure reduces the risk of a large portion of the Parish's critical sugarcane crops from flooding from this type of storm surge event. If the Parish in the future makes improvements to LA Hwy. 3125, any additional height added to the entire highway could add to the structures risk reduction level behind the highway. Due to the fact that the roadway is being used as a flood risk reduction feature, the local sponsor will be required to maintain the system's initial level of risk reduction. This includes the berm tie-in points to the roadway and 13 miles of the roadway itself. If the roadway requires maintenance and would be degraded below its original elevation, the work should take place outside of hurricane season. If it is not possible to work outside of hurricane season, interim flood risk measures should be implemented to maintain the original level of risk reduction provided by the roadway.

The Recommended Plan includes 145 flap gate closures, two floodgates and two small berms (Noranda and Uncle Sam). The Noranda berm ties the highway into high ground east of Gramercy. The Uncle Sam berm divides the developed area behind LA Hwy. 3125 from an area that is primarily agricultural land. By dividing these two areas, the local community can focus its reduction efforts in the future. Future improvements could be focused on sections of the highway that have structures behind the highway, approximately 7 miles vs. 13 miles. The area west of the Uncle Sam berm includes an area of 8,175 acres, but only includes one structure that has a first floor elevation below the 1% probability storm stages. The total length of the berms is approximately 645 LF.

Due to the nature of the flooding south of LA Hwy. 3125, it is assumed that the 19,500 acres would have ample storage capacity to hold any rainfall during the surge events. Even if some acres of crops are flooded from rainfall, it would be much less severe than if storm surge was allowed to flow under LA Hwy. 3125.

Remaining Structures in St. James Parish

Eighty structures were evaluated outside of the economically-justified and unjustified berms. Only 23 of the 80 structures have a first floor elevation below the 1% probability storm stages in Year 2020. Based on this evaluation, the Recommended Plan includes 14 residential structures that would be raised to the stage associated with the Year 2070 intermediate RSLR 1% probability storm stages; 4 non-residential structures would be floodproofed to 3 feet above the ground elevation; and smaller berms would be constructed for 5 light industrial/warehouse facilities. The 14 residential structures are being raised to the Year 2070 height because it is more cost effective to raise a home once.

The incremental first cost for the levee system in the Recommended Plan is $676,598,000. The incremental first cost for the localized storm surge risk reduction system in the Recommended Plan is $41,493,000. The total first cost for the Recommended Plan is $718,091,000.

Hydraulics and Hydrology

Interior Modeling Methodology (Without-Project and With-Project - Alignment C)

Hydrology

General. The hydrologic model was developed utilizing HEC-HMS 3.5. Rainfall runoff hydrographs were generated throughout the system for synthetic rain events. Synthetic flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 1-, 5-, 10-, 25-, 50-, 100-, 200- and 500-year (recurrence interval) have been selected as having special significance for floodplain management. As an example, the 10-year and 100-year floods have a 10 percent and 1 percent chance of occurring and of being equaled or exceeded during any year, respectively. Rainfall totals for these frequency events were derived from the NOAA Atlas 14 Precipitation Frequency Data Server (PFDS).

Drainage Basin Area Delineation. The drainage basin areas were directly taken from the ADvanced CIRCulation (ADCIRC) model. ADCIRC is a system of computer programs for solving time-dependent, free-surface circulation and transport problems in two and three dimensions. These programs utilize the finite element method in space allowing the use of highly flexible, unstructured grids. In areas where newer models were available, the ADCIRC basins were supplemented with newer and more relevant basin delineation. Those particular areas were in St. John the Baptist Parish. The basin areas from that model were overlaid and merged with the original ADCIRC basins.

Basin Parameter Determination. For each of the drainage areas delineated within the watersheds, estimates were made of the homogeneous surface characteristics and soil properties needed to characterize the runoff potential. These data define the individual characteristics of each of the drainage areas as direct input parameters for the hydrologic model.

Each sub-basin (storage area) requires an entry of seven pieces of data, or hydrologic parameters, in order to compute a hydrograph: the name of the sub-basin; the sub-basin size, the initial loss rate, the percent of the sub-basin that is impervious; the Soil Conservation Service (SCS) curve number (CN); the lag time and the base flow in cubic feet per second.. The model is made up of several sub-basin elements, each containing these seven pieces of data, and an outflow channel system that can carry the runoff downstream where it may combine with other runoff to generate a flood wave in the watercourse.

Soil Type and Land Use. The SCS curve number is related to soil type, land use and antecedent moisture conditions. More information about the background and use in the SCS curve number method can be found at USDA Natural Resource Conservation Service (NRCS). The curve number is a non-dimensional value that ranges between 1 and 100 that the SCS method uses to represent the potential for surface runoff from a watershed. Higher CN values indicate higher potential runoff, corresponding with a lower amount of rainfall “losses”. The major factors that determine CN are the hydrologic soil group, cover type, treatment, hydrologic condition and antecedent runoff condition.

The curve numbers listed in Appendix A of the HEC-HMS Technical Reference Manual for every land use type are sub-classified into different hydrologic soil groups. SCS soil maps were downloaded from the web site http://soildatamart.nrcs.usda.gov and clipped with the watershed borders in GIS. Two different hydrologic soil types are found in the modeled watersheds (C &

D).

The digitized land use shape file was intersected with the soil shape file using ArcGIS, resulting in 22 different CN surface types: 11 land use types, each with two different hydrologic soil types. In the attribute table, the area of every sub-element was calculated using the area formula in the field calculator. These areas were then tabulated in ArcGIS, using the watershed sub-basin name as row theme and the surface types as columns. The resulting table was exported to Microsoft Excel, where the corresponding CNs were assigned to every soil-land use category.

Initial Losses. Initial losses were computed using the SCS loss rate method. In this method, 20% of the maximum retention is taken to be the initial abstraction or "initial loss in inches". Runoff losses for the model were determined by the SCS CN method. The equation is as follows:

$$I_a = 0.2 * (\frac{1000}{CN} - 10)$$

Lag Time Calculations. Some sub-basins are extremely low-lying, offering little change in slope and have large areas available for the storage of water. Modeling these areas utilizing mostly traditional hydrologic engineering methods could be inaccurate based on the fact that most methods do not compensate for such small slopes and such large areas available for storage. Sub-basins were modeled in HEC-HMS utilizing the SCS unit hydrograph procedure. The SCS method can be used for urban areas that are less than 2,000 acres or 3.1 sq. mi. Lag Time calculations were computed for each sub-basin using the SCS lag time equation which includes the slope of the sub-basin, the length of travel and the SCS curve number. The Lag Time calculation equation used is as follows:

$$T_L = L^{0.8} * \frac{(S+1)^{0.7}}{(1900 * y^{0.5})}$$

Where:

T_L= Sub-basin Lag Time (hr)

L = Hydraulic Length (ft)

S = (1000/CN) – 10

CN = Sub-basin Average Curve Number

y = Average Sub-basin Land Slope (%)

Flow path lengths were measured from the farthest point in the sub-basin to the lowest point in the sub-basin. These paths were determined by visual inspection of the Light Detection and Ranging (LiDAR) imagery. Using ArcGIS Spatial Analyst Slope feature, a slope grid was produced from the LiDAR imagery. The grid is the slope of a particular pixel in relation to its eight neighboring pixels. The average sub-basin land slope of each sub-basin was calculated using Zonal Statistics from Spatial Analyst Tools. After calculating the necessary input data, the data was entered into the SCS Lag Time equation for each sub-basin. Next, the Lag Time was

then entered into the appropriate sub-basin in HEC-HMS. HEC-HMS was run and rainfall runoff hydrographs were computed for each sub-basin. Then, the rainfall runoff hydrographs were entered as input to the HEC-RAS hydraulic model.

Table 1 lists the parameters described above used in the existing conditions hydrologic model.

Storage	Lag (min)	Area (Sq Mi)	CN	Impervious (%)	Initial (in)
SA 1	79.07	0.739	81.78	13.81	0.446
SA 10	109.61	1.230	82.43	15.76	0.426
SA 11	55.47	0.401	89.44	78.92	0.236
SA 12	108.97	1.669	80.59	18.49	0.482
SA 13	70.18	0.696	82.17	12.72	0.434
SA 14	84.86	1.181	83.36	4.45	0.399
SA 15	104.20	0.756	80.88	30.63	0.473
SA 16	78.88	0.562	77.05	9.10	0.596
SA 17	74.48	1.017	75.81	1.07	0.638
SA 18	56.13	0.150	77.35	6.77	0.586
SA 19	85.94	0.532	81.08	8.55	0.467
SA 2	124.66	1.519	80.66	18.30	0.479
SA 20	63.46	0.183	79.50	6.77	0.516
SA 21	138.33	1.122	81.81	26.05	0.445
SA 22	50.64	0.487	81.42	6.93	0.456
SA 23	57.82	0.480	81.56	32.69	0.452
SA 24	63.83	0.504	78.16	25.96	0.559
SA 25	36.27	0.243	76.94	6.04	0.599
SA 26	69.25	1.190	80.42	3.98	0.487
SA 27	77.24	0.929	81.06	5.78	0.467
SA 28X	37.89	0.461	82.16	7.28	0.434
SA 28Y	55.94	0.309	81.72	3.95	0.447
SA 29	86.07	0.921	81.52	12.92	0.453
SA 29C	120.99	0.571	82.83	3.64	0.415
SA 3	37.62	0.503	84.63	42.58	0.363
SA 30	63.53	0.701	80.98	35.08	0.470
SA 30C	61.66	0.297	81.42	3.83	0.457
SA 31	93.81	1.823	81.02	29.86	0.469
SA 31C	35.27	0.153	82.23	7.87	0.432
SA 32	116.31	1.342	78.94	31.48	0.534
SA 33	111.25	0.801	78.80	32.40	0.538
SA 34	62.32	0.839	79.41	34.82	0.519
SA 35	87.93	0.460	78.59	27.91	0.545
SA 36	89.92	0.690	77.57	20.23	0.578
SA 37	150.33	1.346	78.77	2.88	0.539
SA 38	59.33	0.404	78.63	30.99	0.544
SA 39	79.40	0.595	77.26	11.42	0.589
SA 39C	97.01	0.949	76.04	0.66	0.630
SA 4	64.38	0.859	81.94	28.75	0.441
SA 40P	277.53	8.502	81.94	0.74	0.441
SA 41	119.15	0.347	76.54	17.51	0.613
SA 41P	203.21	5.770	82.01	0.89	0.439
SA 42P	163.17	2.514	77.71	2.60	0.574
SA 43P	120.44	2.503	76.09	0.69	0.629
SA 44C	25.66	0.156	79.64	25.37	0.511

SA 5	78.19	1.105	83.53	22.72	0.394
SA 6	59.25	0.304	81.91	28.90	0.442
SA 7	48.51	0.508	78.86	21.18	0.536
SA 8	138.25	2.073	77.05	13.32	0.596
SA 9	65.84	0.785	79.61	4.22	0.512

Table 1: HEC-HMS parameters for Existing Conditions

Table 2 lists the parameters described above used in the with-project hydrologic model.

Storage Area	Lag Time (min)	Area (sq mi)	CN	Impervious (%)	Initial Abstraction (in)
SA 1	80.51	0.612	81.58	15.63	0.452
SA 10	109.56	1.230	82.47	15.04	0.425
SA 100	12.72	0.096	82.78	2.38	0.416
SA 101	59.64	0.541	76.77	4.76	0.605
SA 102	32.95	0.083	81.98	7.14	0.440
SA 11	55.64	0.401	89.44	79.80	0.236
SA 12	108.66	1.669	80.60	18.60	0.481
SA 13	70.24	0.696	82.20	13.23	0.433
SA 14	84.86	1.181	83.35	4.21	0.400
SA 15	104.33	0.756	80.87	30.76	0.473
SA 16	78.82	0.562	77.05	9.22	0.596
SA 17	74.44	1.017	75.80	1.06	0.639
SA 18	17.48	0.049	80.83	4.71	0.474
SA 19	85.78	0.532	81.08	8.41	0.467
SA 2	125.22	1.519	80.67	17.79	0.479
SA 20	62.99	0.183	79.50	7.52	0.516
SA 21	138.37	1.122	81.82	26.17	0.444
SA 22	50.63	0.487	81.42	6.83	0.456

SA 23	57.73	0.480	81.59	32.44	0.451
SA 24	63.24	0.504	78.14	24.13	0.560
SA 25	36.56	0.243	76.86	5.20	0.602
SA 26	69.54	1.190	80.42	3.70	0.487
SA 27	77.30	0.929	81.08	5.67	0.467
SA 28X	37.73	0.461	82.18	6.99	0.434
SA 28Y	56.51	0.309	81.72	4.08	0.447
SA 29	85.78	0.921	81.50	12.65	0.454
SA 29C	120.72	0.571	82.84	3.91	0.414
SA 3	37.22	0.503	84.62	42.44	0.363
SA 30	63.38	0.701	80.99	33.76	0.469
SA 30C	62.05	0.297	81.38	3.42	0.458
SA 31	94.23	1.823	81.00	30.00	0.469
SA 31C	35.32	0.153	82.23	5.67	0.432
SA 32	116.40	1.342	78.94	31.52	0.534
SA 33	110.80	0.801	78.78	33.27	0.539
SA 34	62.92	0.839	79.46	33.69	0.517
SA 35	88.29	0.460	78.61	28.45	0.544
SA 36	90.34	0.690	77.58	21.87	0.578
SA 37	150.02	1.346	78.78	2.95	0.539
SA 38	59.37	0.404	78.66	30.82	0.543
SA 39	79.16	0.595	77.30	12.89	0.587
SA 39C	97.03	0.949	76.04	0.59	0.630
SA 4	64.38	0.859	81.96	29.11	0.440
SA 40P	103.36	2.212	81.59	0.37	0.451
SA 41	119.20	0.347	76.54	17.47	0.613

SA 41P	155.34	4.550	81.99	0.48	0.439
SA 42P	161.39	2.397	77.79	3.00	0.571
SA 43P	118.85	2.362	75.99	0.77	0.632
SA 44C	25.66	0.156	79.65	26.03	0.511
SA 5	78.40	1.105	83.53	22.66	0.394
SA 6	59.78	0.304	81.97	28.63	0.440
SA 7	48.60	0.508	78.90	21.46	0.535
SA 8	138.66	2.073	77.06	13.76	0.595
SA 9	37.06	0.310	80.77	6.86	0.476

Table 2: HEC-HMS parameter for With-Project (Alignment C)

Reach Parameter Calculation. The model is tied together by a series of routing reaches and junctions where several flow paths join into one channel as the flood wave moves downstream. A reach represents a portion of the natural channel that carries the flood. The velocity of the water moving through the reach and the amount of channel storage available to the water determines the rate or speed of translation of the flood wave. The more storage that is available, the less speed of translation and the longer duration of flood effects that are observed. The model parameters can be selected to account for channel and overbank storage using several routing techniques that are options in the software. As the base flow is negligible in modeling large events, no base flow method was used.

Rainfall. Frequency-based synthetic rainfall (Table 3) was used for each sub-basin in the model. The rainfalls were taken from NOAA Atlas 14 Precipitation Frequency Data Server (PFDS). A 24-hour storm duration (total rain time) was chosen based on time of concentration and to remain consistent with other studies conducted by the U.S. Army Corps of Engineers.

Duration	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	200 Yr	500 Yr
5 minutes	0.59	0.73	0.84	1.00	1.13	1.26	1.40	1.58
15 minutes	1.06	1.3	1.51	1.79	2.02	2.25	2.50	2.82
1 hour	2.14	2.68	3.16	3.84	4.40	4.98	5.59	6.43
2 hours	2.68	3.39	4.01	4.93	5.70	6.50	7.36	8.56
3 hours	3.03	3.84	4.58	5.70	6.64	7.65	8.75	10.3
6 hours	3.65	4.67	5.61	7.05	8.27	9.60	11.05	13.12

12 hours	4.34	5.57	6.69	8.39	9.83	11.38	13.06	15.46
24 hours	5.07	6.47	7.74	9.65	11.25	12.96	14.82	17.45

Table 3: Frequency-Based Synthetic Rainfall Distributions for St. John the Baptist Parish

Since HEC-HMS only has probability for the 50 percent to the 0.2 percent rainfall, the SCS storm (NRCS) total rainfall depth was used for the 1-year rainfall event. The total depth for the 1-year rainfall according to NOAA Atlas 14 Precipitation Frequency Data Server is 4.50 inches. The time distribution selected for this area was Type 1.

Hydraulics

Geometry

Topographic Data Used. The 5x5 meter LiDAR field data (downloaded from http://atlas.lsu.edu/LiDAR) was used to define topographic features because it gave a better resolution than the 30x30 DEM (Digital Elevation Model) method. The field point data was categorized into the following sets: a set of raw points, a set of edited points and a contour line shapefile. The metadata file, which was also included, describes the projection of the data points and their level of accuracy.

The contour line shapefile, consisted of vector lines with elevation data at two-foot intervals. This contour vector data was then used in a GIS (Geographic Information System) program to display any desired projection.

Datum. The Datum used for the modeling project is NAVD88 (Epoch 2004.65). This Datum was used throughout the development of the model and all stages and elevations reported in this document are to this datum. No conversions of data due to datum discrepancies were required in the model.

Once the HEC-HMS hydrological model was completed, the runoff hydrographs were placed as input into the HEC-RAS hydraulic model. The hydraulic model consists of canals, storage areas and structures (such as bridges, pumping stations, inline weirs and lateral weirs).

Canal Alignments and Connections. The basic alignment of canals, storage areas and connections was taken from the USACE ADCIRC West Shore-Lake Pontchartrain model. It was then modified by adding lateral weirs representing areas conducive to bank overflow into the various parts (Storage Areas) of the model. LiDAR imagery was used to establish top-of-bank elevations for lateral weirs.

Canal Cross Sections. The detailed area of St. John the Baptist Parish was taken from the HEC-RAS model developed by Burk-Kleinpeter, Inc. (BKI). The dimensions of other canals were determined by conducting a reconnaissance-level survey of the most important canals and their related crossings.

The Manning's "N" values were taken from the HEC-RAS Technical Reference Manual for typical canal sections with earthen, concrete and rip-rap bottoms.

Pump Stations. Existing pumping stations were modeled in HEC-RAS using the existing pump curves, as described below. Proposed pumping station pump curves were taken from pump curves of commonly-used centrifugal pumps of appropriate size.

Calibration. Calibration is a process whereby the model is adjusted to better simulate the actual drainage system and a storm event with recorded data. This is usually accomplished by analyzing the performance of the model when an historical rainfall is provided as input. For this model, no historical storm events with recorded data were available. A common method of calibration / validation (when no such data is available) is simulating a 10% recurrence storm and plotting its inundation over the study area. Once that is done, the inundation map is given to the drainage department of the area of study and comments are provided on the extent of the mapping.

For this project, an inundation map of the 10% recurrence simulation was provided to the St. John the Baptist Parish Drainage Department. Comments were provided on several areas that didn't seem to match historical inundation for the 10% storm. Even though a detailed channel network was not available for all areas of the project area, parameters were adjusted so the new inundation more closely matched the historical inundation.

With-Project Model. The levee alignment (Alignment C) was overlaid on the existing conditions sub-basin (storage area) map to determine which sub-basins (storage areas) would be affected by the alignment. The affected sub-basins (storage areas) were then edited to reflect the reduced elevation-volume and gross area. New parameters for the HEC-HMS models were calculated (Table 4). New elevation-volume curves were also calculated and modified in HEC-RAS.

Lateral Structures (weirs) were placed in the model to simulate overflow from canals to and from storage areas.

Gates and pumps were added to the with-project HEC-RAS model. The gates are to promote normal tidal exchange and allow rainwater to move out of the system during normal or low tide conditions. During elevated Lake conditions attributable to hurricane and tropical storm events when the elevation of the lake reaches approximately +1.7 ft. NAVD88, the gates would close and the pumps would evacuate the rain water as it moves through the system. This is expected to occur 8.5 days per year.

The gravity drainage gates and pumps would be placed in the new levee alignment at the following canals:

1. Hope Canal
2. Reserve Relief Canal
3. Ridgefield Canal
4. Montz Canal / Woodland Canal

The gravity drainage gates would be placed in the new levee alignment at the following canals:

1. Mississippi Bayou
2. Perriloux Canal

The storage areas for the proposed model were developed in the same way as those in the existing model. Additional storage areas were created along Alignment C. The levee alignment bisects some storage areas and produces the need to add some new storage areas.

RESULTS AND EVALUATION

As stated in Chapter 5 of the Main Report, hydrologic connectivity would be maintained to the extent practicable through water control structures except during closure for hurricanes or tropical storms. When the system is closed, pumps would operate on average for 1.7 storms per year, which equates to a closure of structures on average 8.5 days per year. This expected rate of closure would be the same regardless of the actual rate of SLR as closure of the system is tied to tropical storm events and the elevation trigger would be adjusted as sea level rises. The risk reduction system is only authorized to address storm surge caused by hurricane and tropical storm events. It is not authorized to mitigate for or reduce impacts caused by higher day-to-day water levels brought about by increases in sea level rise. Any operational changes implemented to address changing SLR conditions or for any other non-project-related purpose would be considered a separate project purpose requiring separate authorization, new NEPA documentation, and/or permit approvals.

An assessment was conducted to analyze the water levels in the surrounding lakes. A hydraulic analysis was performed using HEC-RAS and synthetic frequency rainfall. An initial condition run was established and simulated. The objective of the initial condition simulation is to establish the interior stages to an elevation equal to the actual elevations after high lake elevations for 5 to 7 days. The elevations related to the last profile in the initial conditions simulation are used to begin the synthetic frequency rainfall simulations. This method ensures the model starts with the same interior basin stages that would occur before the gates are closed.

In this section of the Engineering Appendix, the 10% recurrence interval rainfall event (10-Year) for the existing condition (year 2013) and future development condition (Year 2070) are compared. Note - no future land development was considered for the future development condition in the hydrology simulation (HEC-HMS). The only difference is the addition of relative sea level rise (SLR) at the downstream boundaries of the model. The SLR values were added directly to the original downstream boundary.

Table 4 below is the comparison of storage area stages for without-project (Year 2013) and the with-project (Year 2013).

	Without-Project				**With-Project**			
SA	**RT1yr**	**RT5yr**	**RT10yr**	**RT25yr**	**RT1yr**	**RT5yr**	**RT10yr**	**RT25yr**
SA18	2.05	2.20	2.31	2.44	2.05	2.20	2.31	2.44
SA9	3.23	4.24	4.45	4.73	3.23	4.24	4.45	4.73
SA1	5.09	5.81	6.14	6.49	5.09	5.81	6.11	6.52
SA2	6.00	6.83	7.23	7.69	6.02	6.85	7.25	7.70
SA3	13.57	14.00	14.27	14.64	13.58	14.01	14.28	14.65
SA4	11.18	11.67	11.98	12.41	11.19	11.68	12.00	12.42
SA5	11.28	12.00	12.36	12.54	11.31	12.03	12.39	12.56
SA6	12.06	12.63	12.97	13.28	12.06	12.63	12.99	13.28
SA7	4.95	5.87	6.36	6.94	4.97	5.89	6.38	6.96
SA8	6.28	7.26	7.67	7.93	6.30	7.28	7.69	7.94
SA10	3.59	3.81	3.92	4.07	3.62	3.83	3.98	4.12
SA11	6.75	6.96	7.11	7.58	6.76	6.97	7.13	7.60
SA12	5.78	6.72	7.11	7.58	5.81	6.75	7.13	7.60

SA13	4.86	5.31	5.53	5.83	4.88	5.33	5.55	5.85
SA14	8.09	8.88	9.11	9.29	8.12	8.91	9.12	9.30
SA15	8.83	9.77	10.05	10.28	8.85	9.79	10.07	10.29
SA16	4.95	5.81	6.24	6.66	4.96	5.83	6.25	6.68
SA17	3.20	4.36	4.94	5.71	3.23	4.38	4.96	5.73
SA25	3.11	4.29	4.88	5.61	3.15	4.30	4.89	5.63
SA22	4.83	5.73	5.99	6.15	4.85	5.75	6.00	6.15
SA21	3.27	3.87	4.36	4.83	3.33	3.89	4.39	4.84
SA19	2.07	2.28	2.42	2.50	2.07	2.28	2.42	2.50
SA20	3.20	3.49	3.62	3.74	3.22	3.51	3.63	3.86
SA43P	2.08	2.38	2.56	2.86	2.08	2.38	2.47	2.81
SA42P	1.86	2.03	2.12	2.30	1.71	1.84	1.92	2.38
SA26P	1.86	2.03	2.12	2.31	1.74	1.87	1.94	2.41
SA28Y	1.86	2.03	2.12	2.31	1.73	1.86	1.94	2.40
SA29C	1.86	2.03	2.12	2.31	1.73	1.86	1.94	2.40
SA30	1.86	2.03	2.12	2.31	1.74	1.87	1.94	2.40
SA44C	1.76	1.89	1.96	2.14	1.74	1.84	1.92	2.38
SA41P	1.86	2.03	2.12	2.30	1.73	1.86	1.94	2.40
SA40P	1.86	2.03	2.12	2.30	1.73	1.86	1.94	2.40
SA31	2.29	2.75	2.98	3.28	2.32	2.73	2.94	3.23
SA32	2.22	2.70	2.94	3.29	2.27	2.66	2.90	3.23
SA41	2.19	2.67	2.90	3.20	2.26	2.63	2.86	3.17
SA35	2.92	3.24	3.36	3.54	2.92	3.24	3.37	3.55
SA38	2.80	2.89	2.93	2.98	2.81	2.90	2.94	2.99
SA37	2.49	2.68	2.77	2.86	2.50	2.69	2.77	2.87
SA36	1.82	2.23	2.62	3.11	1.76	2.18	2.56	2.98
SA27	1.86	2.03	2.12	2.31	1.74	1.87	1.94	2.41
SA30C	1.86	2.03	2.12	2.31	1.74	1.87	1.94	2.40
SA23	5.95	6.72	6.99	7.40	5.98	6.74	7.02	7.42
SA24	4.58	5.77	6.22	6.64	4.59	5.79	6.23	6.65
SA28X	1.86	2.03	2.12	2.31	1.74	1.87	1.94	2.40
SA39	2.08	2.39	2.56	2.86	2.10	2.39	2.47	2.81
SA39C	2.08	2.39	2.56	2.86	2.08	2.38	2.47	2.81
SA34	3.03	3.67	3.96	4.26	3.02	3.67	3.97	4.27
SA33	3.72	4.04	4.17	4.31	3.73	4.05	4.18	4.32
SA31C	2.28	2.73	2.94	3.20	2.31	2.70	2.90	3.14
SA29Y	3.20	3.79	3.91	4.34	3.22	3.81	4.25	4.68

Table 4: Year 2013 Comparison of Stages: With-Project vs. Without-Project

Table 5 below is the comparison of storage area stages for Without-Project (Year 2070 Intermediate SLR) and the With-Project (Year 2070 Intermediate SLR).

	Without-Project				**With-Project**			
SA	**RT1yr**	**RT5yr**	**RT10yr**	**RT25yr**	**RT1yr**	**RT5yr**	**RT10yr**	**RT25yr**
SA18	2.07	2.86	2.86	3.04	2.07	2.86	2.86	3.04

SA9	3.24	4.30	4.50	4.77	3.24	4.30	4.50	4.77
SA1	5.09	5.81	6.14	6.49	5.23	5.81	6.11	6.52
SA2	6.00	6.83	7.23	7.69	6.00	6.85	7.25	7.70
SA3	13.57	14.00	14.27	14.64	13.57	14.01	14.28	14.65
SA4	11.18	11.67	11.98	12.41	11.18	11.68	12.00	12.42
SA5	11.28	12.00	12.36	12.54	11.28	12.03	12.39	12.56
SA6	12.06	12.63	12.98	13.28	12.06	12.63	12.98	13.28
SA7	4.96	5.89	6.37	6.94	4.95	5.89	6.38	6.96
SA8	6.28	7.26	7.67	7.93	6.28	7.28	7.69	7.94
SA10	3.65	4.13	4.16	4.21	3.57	3.83	3.98	4.12
SA11	6.75	6.96	7.12	7.58	6.76	6.97	7.13	7.60
SA12	5.78	6.72	7.12	7.58	5.78	6.75	7.13	7.60
SA13	4.86	5.31	5.53	5.83	4.86	5.33	5.55	5.85
SA14	8.09	8.88	9.11	9.29	8.09	8.91	9.12	9.30
SA15	8.84	9.78	10.05	10.28	8.83	9.79	10.07	10.29
SA16	4.95	5.83	6.25	6.67	4.95	5.83	6.25	6.68
SA17	3.25	4.39	4.96	5.72	3.29	4.39	4.97	5.73
SA25	3.16	4.32	4.90	5.62	3.19	4.32	4.91	5.64
SA22	4.84	5.78	6.02	6.18	4.83	5.75	6.00	6.15
SA21	3.80	4.69	4.93	5.30	3.23	3.89	4.39	4.84
SA19	3.46	4.08	4.10	4.11	1.88	2.81	3.28	3.84
SA20	3.45	4.08	4.10	4.12	3.20	3.51	3.63	3.84
SA43P	2.19	2.51	2.68	2.94	2.22	2.50	2.67	2.92
SA42P	3.44	3.95	3.99	4.02	0.87	1.27	1.51	1.76
SA26P	3.44	3.96	4.00	4.02	1.31	1.66	1.76	1.89
SA28Y	3.44	3.96	4.00	4.03	1.12	1.42	1.57	1.83
SA29C	3.45	3.96	4.01	4.03	1.50	1.70	1.78	1.88
SA30	3.44	3.96	4.00	4.03	1.47	1.74	1.85	2.00
SA44C	2.52	3.11	3.18	3.29	0.87	1.27	1.51	1.76
SA41P	3.43	3.95	4.00	4.02	0.87	1.29	1.55	1.83
SA40P	3.44	3.96	4.00	4.02	0.87	1.29	1.55	1.83
SA31	3.44	3.96	4.01	4.15	1.89	2.51	2.80	3.10
SA32	3.05	3.50	3.66	3.84	2.01	2.57	2.84	3.18
SA41	3.02	3.43	3.55	3.71	1.72	2.53	2.80	3.11
SA35	2.93	3.31	3.46	3.68	2.92	3.24	3.37	3.55
SA38	2.80	2.89	2.93	2.98	2.80	2.90	2.94	2.99
SA37	2.49	2.68	2.77	2.94	2.49	2.69	2.77	2.92
SA36	2.62	3.28	3.44	3.65	1.80	2.08	2.51	2.95
SA27	3.44	3.96	4.00	4.02	1.18	1.44	1.55	1.83
SA30C	3.45	3.95	4.01	4.03	1.46	1.73	1.84	1.98
SA23	5.98	6.75	7.03	7.43	6.00	6.75	7.03	7.43
SA24	4.72	5.79	6.23	6.65	4.55	5.78	6.23	6.65
SA28X	3.44	3.96	4.00	4.02	0.80	1.38	1.55	1.83
SA39	2.20	2.52	2.69	2.94	2.22	2.51	2.67	2.93
SA39C	2.20	2.52	2.68	2.94	2.22	2.50	2.67	2.92

SA34	3.05	4.02	4.20	4.37	3.02	3.67	3.97	4.27
SA33	3.72	4.11	4.24	4.38	3.72	4.05	4.18	4.32
SA31C	3.44	3.96	4.01	4.05	1.89	2.50	2.78	3.05
SA29Y	3.32	4.26	4.52	4.82	2.75	3.81	4.25	4.68

Table 5: Year 2070 Intermediate SLR Comparison of stages: With-Project vs. Without-Project

By carefully reviewing the results in the tables, the largest reduction occurs when SLR is incorporated into the analysis. Without the levee for risk reduction during hurricane and tropical storm events, elevated lake levels infiltrate the unprotected area of St. Charles and St. John the Baptist Parishes and cause flooding.

Because of the lack of stream detail in the model, the areas away from the new pumping stations are unable to drain effectively to the stations and the analysis shows no elevated stages. A more detailed analysis that includes new channel sections and additional channel geometry from surveys, would likely show reduced stages for the with-project condition.

Exterior Storm Surge Modeling

This portion of the report documents some of the post-processing steps that were performed to determine stage-frequency and associated wave conditions from raw ADCIRC data. A brief summary of the different ADCIRC meshes used in the analysis is described first. Then, some of the surge results are examined in order to explain how the stage-frequency and associated wave values are determined from raw ADCIRC output. It should be noted that an ADCIRC modeling report was completed 22 April 2011. The ADCIRC model used was subjected to an Agency Technical Review (ATR), which was completed 28 September 2011.

Table 6 contains a summary of the ADCIRC simulations performed for the analysis. A total of 152 storms were included in the analysis for the 2011 base condition, on a version of the SL15 mesh that includes HSDRRS features such as the lHNC barrier and the Seabrook closure. After Hurricane Katrina, it was decided (in 2006) to pursue a common technical framework for use by all Federal Agencies that are involved with assessing hurricane-related threats to coastal communities; this includes storm selection and statistical performance. A detailed explanation of the selection of hypothetical storms, probabilities and statistical performance is in a document entitled “White Paper on Estimating Hurricane Inundation Probabilities for Storm Selection and Statistics Reference” (dated 10 June 2007). The mesh also includes added resolution in the project area. Figure 2 displays a version of SL15 which does not include the added resolution for the project area. Figure 3 displays the mesh with added resolution. The areas that appear black are areas that include high resolution. Future condition meshes were created for the “No Action” or “Without-Project Condition” and the “With-Project Condition”. The Year 2020 meshes include a modest SLR value of 0.3ft. In the Year 2020 mesh, the nodal attributes including bottom friction and canopy cover are not modified to reflect land loss that occurs with SLR. For Year 2020, it is assumed that the landscape will not change drastically enough to warrant modifying bottom friction or canopy coefficients. For the Year 2070 meshes, the nodal attributes are modified to reflect a future condition that includes loss of bottom friction and canopy. The Recommended Plan is Alignment C.

Table 6 Summary of ADCIRC Simulations

NO ACTION ADCIRC RUNS	SLR (ft)

No Action Base Condition 2011	0.00
No Action Future Condition 2020 Intermediate SLR	0.30
No Action Future Condition 2070 Low SLR	1.80
No Action Future Condition 2070 Intermediate SLR	2.30
No Action Future Condition 2070 High SLR	3.00
WITH-PROJECT ADCIRC RUNS	SLR (ft)
Alignment C Future Condition 2020 Intermediate SLR	0.30
Alignment C Future Condition 2070 Low SLR	1.80
Alignment C Future Condition 2070 Intermediate SLR	2.30
Alignment C Future Condition 2070 High SLR	3.00

There are differences between the SLR curves that were used for this project and the SLR curves on the USACE Sea-Level Calculator for Non-NOAA Long-Term Tide Gauges Web Page. For this project, the latest ER (ER 1100-2-8162, dated 31 December 2013) as well as local gages in the project area were used. Extensive time was spent in analyzing the gage data and subsidence, while maintaining as much accuracy as possible. SLR is the effect of eustatic sea level rise and subsidence. The rate of eustatic sea level rise may be the same, generally speaking, but the rate of subsidence in Louisiana varies from one place to another (and it is not a linear relationship). Thus, the SLR curves used for this report were appropriate for the project area.

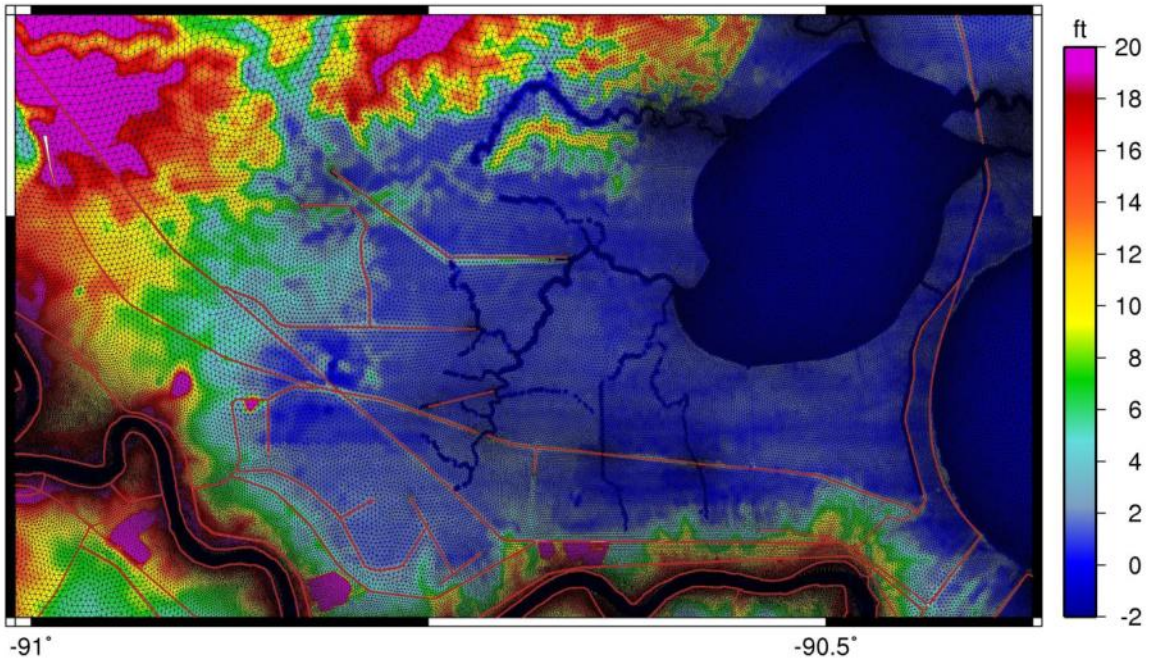


Figure 2 Mesh Elevations and Raised Feature Alignments in the IHNC Study ADCIRC Mesh. Contours are in feet relative to NAVD88 (2004.65 Epoch). Black lines represent element edges and display mesh resolution.

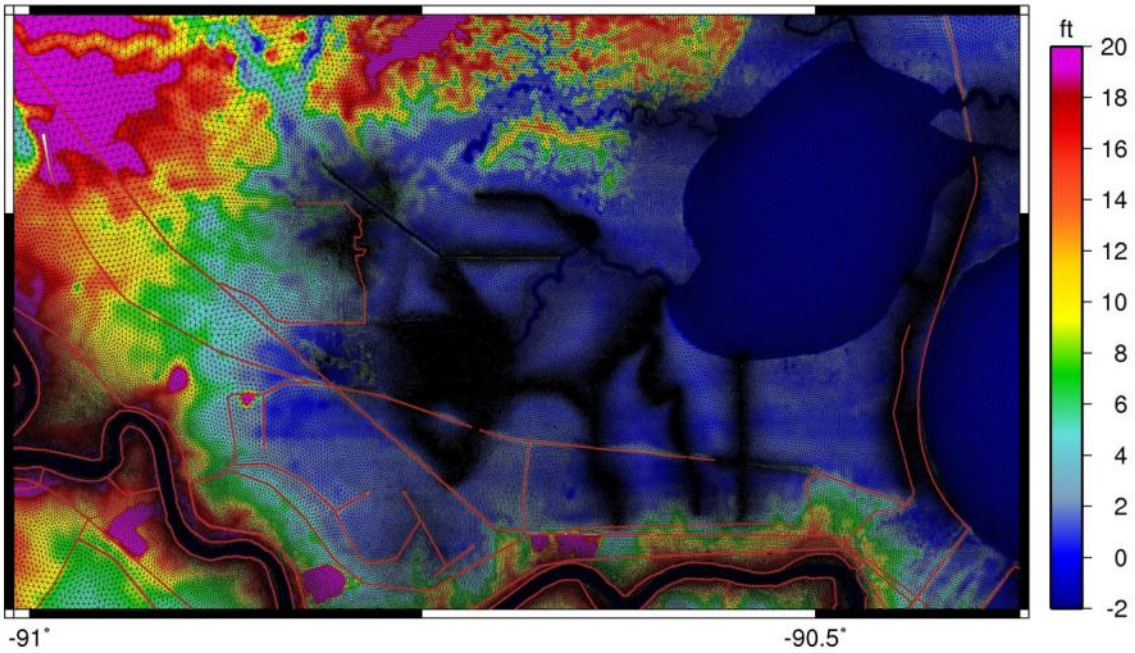


Figure 3 Mesh Elevations and Raised Feature Alignments in the ADCIRC Mesh. Contours are in feet relative to NAVD88 (2004.65 Epoch). Black lines represent element edges and display mesh resolution.

Figure 4 compares peak surge results from the 2011 base condition to the "IHNC 152" base condition. The "IHNC 152" was a suite of 152 simulations used to determine design conditions for the IHNC surge barrier. The IHNC grid, as pictured in Figure 2, does not contain high resolution in the project area. If the peak surge results are compared storm by storm from this project and the IHNC simulation, it can be determined what the effect of the added resolution on stage-frequency is in the project area. The left portion of Figure 4 displays the location of the output point represented as a green dot. This location was selected at the St. Charles Parish portion on HSDRRS, which is represented by a light purple line. The MRL is represented by the red line and Alignment C is represented as a blue line. The right portion of the figure is a regression analysis between the IHNC 152 and the project Base Condition. At the St. Charles Parish location, the surge results are nearly equal for both sets of simulations. Both suites model the same 152 storms, which allows processing in the JPM-OS statistical code. The 50yr, 100yr, 200yr and 500yr returns are plotted for both analyses in blue. For example, the 100yr surge for the IHNC set is 11.8 ft. NAVD88, while the 100yr surge for the project set is 12.0 ft. NAVD88. In summary, at this location, which is located away from the added resolution, the effect of resolution on statistical output results in a 0.1 ft. increase at the 50yr level, a 0.2 ft. increase at the 100yr level, a 0.2 ft. increase at the 200yr level and a 0.3 ft. increase at the 500yr level. It is important to note that the IHNC 152 surge analysis results in the St. Charles Parish area were modified prior to final design. Therefore, the IHNC 152 stage-frequency data presented in Figure 3 is different than what was actually used in HSDRRS design.

Figure 5 compares peak surge results from the 2011 base condition to the "IHNC 152" base condition at Reach 5 of the Alignment C levee. At this output point, the effect of resolution on statistical output results in a 0.3 ft. increase at the 50yr level, a 0.2 ft. increase at the 100yr level, a 0.3 ft. increase at the 200yr level and a 0.4 ft. increase at the 500yr level. Stage-frequency information was developed for the 2011 base condition using the same JPM-OS code as used for the HSDRRS design analysis.

With the 2011 base condition stage-frequency established, the stage-frequency for the 4 SLR conditions, including with- and without-project are processed using a regression analysis. Figure 6 displays a regression analysis between peak surge values of the 2011 base condition and the peak surge values from the Year 2020 Alignment C surge values. In this case, 52 storms are available for the regression. The trend line, as plotted in green, is used to estimate 50yr, 100yr, 200yr and 500yr surge values for the Year 2020 Alignment C condition. At this location, the 100yr for the Year 2020 Alignment C condition is estimated to be 12.2 ft. NAVD88. Figure 7 displays a regression analysis between the Year 2020 Alignment C condition, and the Year 2020 base condition. The trend line in Figure 7 is used to estimate the stage-frequency for the Year 2020 base condition. At this location, the Year 2020 base condition 100yr surge is estimated to be 10.6 ft. NAVD88.

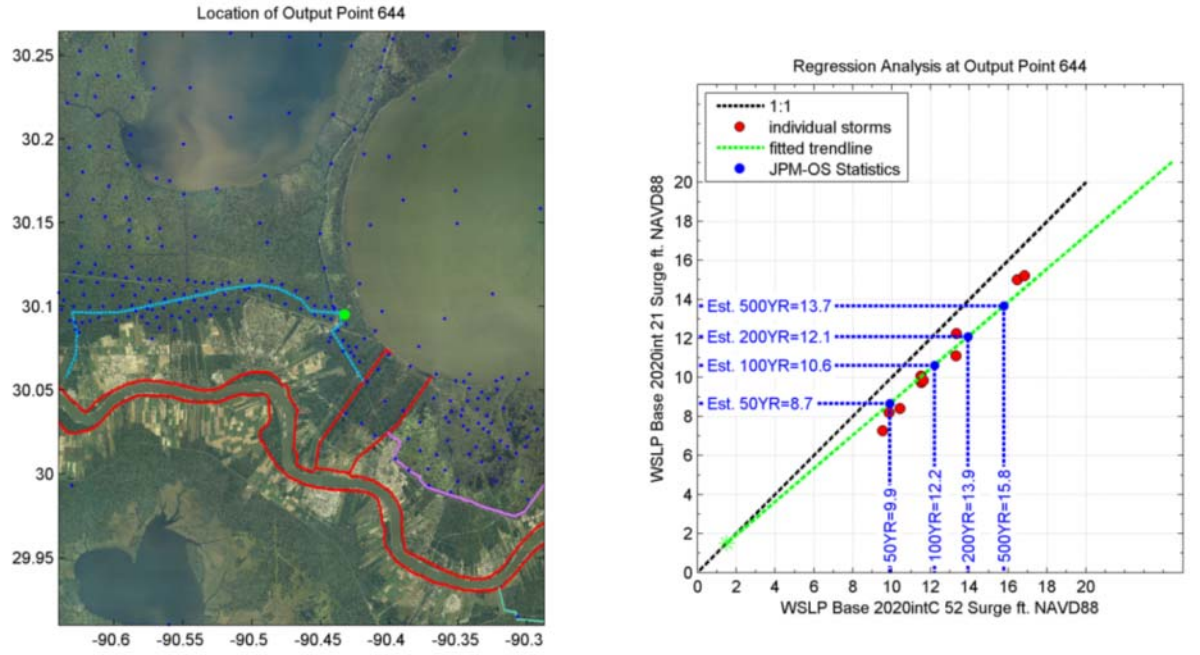


Figure 4 Comparison of IHNC 152 peak storm surge values and the Project 152 Base 2011 peak storm surge values at the St. Charles Parish HSDRRS Levee

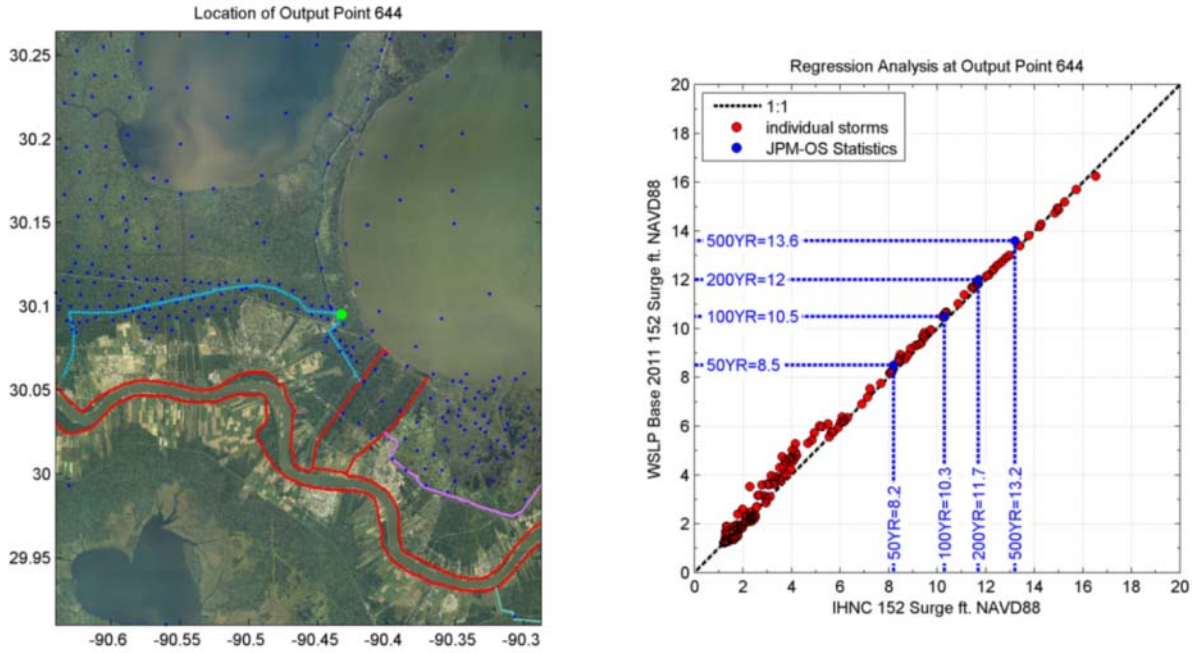


Figure 5 Comparison of IHNC 152 peak storm surge values and Project 152 Base 2011 peak storm surge values at Reach 5 of the project levee

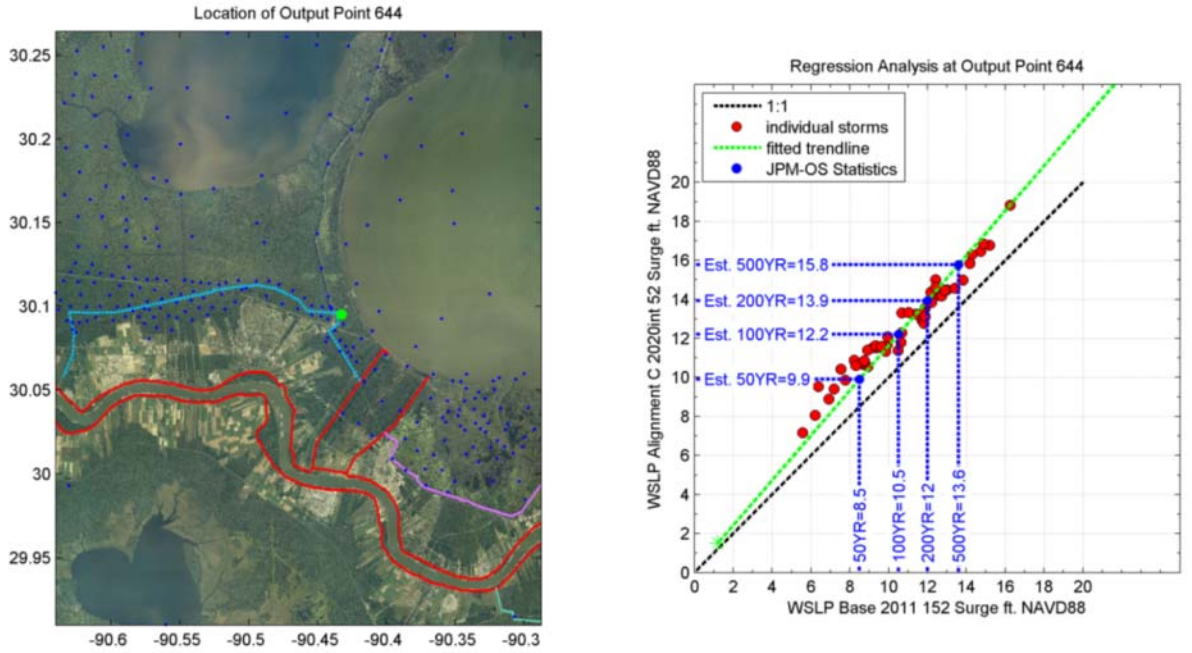


Figure 6 Comparison of Project 152 Base 2011 storm surge values and Project 52 Alignment C 2020 peak storm surge values at Reach 5 of the project levee

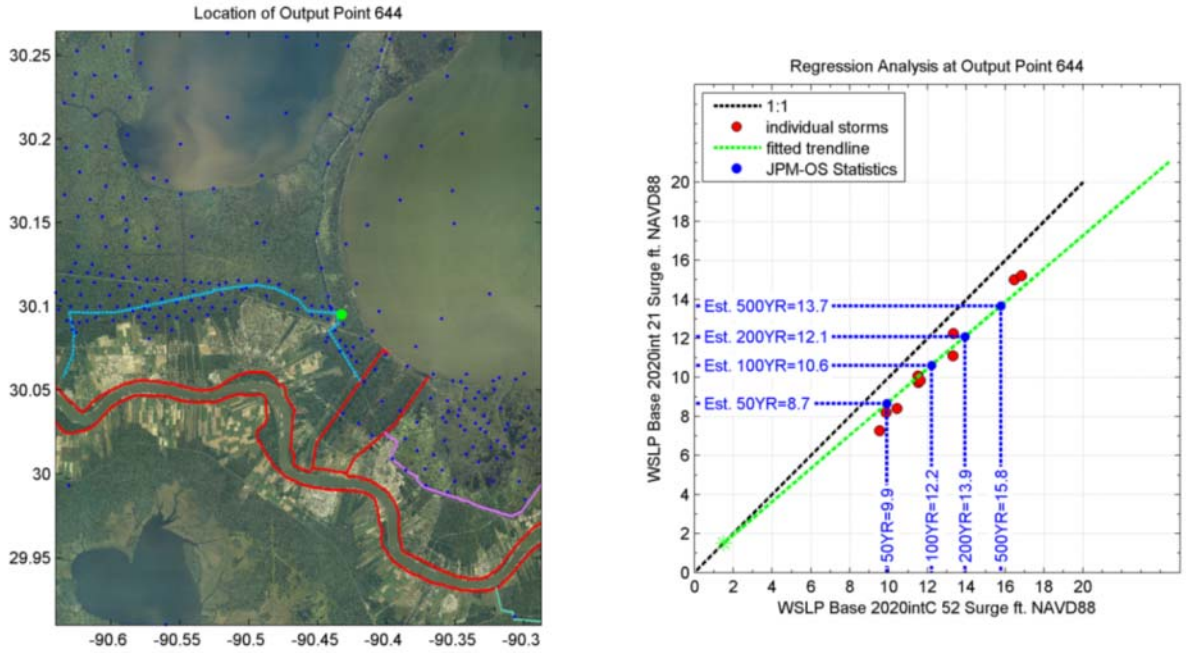


Figure 7 Comparison of Project 52 Alignment C 2020 storm surge values and Project 21 Base 2020 peak storm surge values at Reach 5 of the project levee

Figure 8 displays a regression between peak surge values from the 2011 Base Condition and the Year 2070 low SLR Alignment C condition. The trend line allows estimation of the stage-frequency data for the Year 2070 low SLR Alignment C condition. For example, the 100yr elevation is estimated to be 13.8 ft. NAVD88, based on the trend line. Figure 9 displays a regression plot between peak surge from the Year 2070 low SLR Alignment C condition and the Year 2070 low SLR project base condition. This regression trend line allows estimation of stage-frequency for the Year 2070 low SLR project base condition. For example, the 100yr elevation is estimated to be 12.7 ft. NAVD88.

The same regression analysis is applied for the Year 2070 intermediate SLR condition and the Year 2070 high SLR condition. Figure 10 and Figure 11 display the regression analysis for the Year 2070 intermediate SLR condition. Figure 12 and Figure 13 display the regression analysis for the Year 2070 high SLR condition.

Table 7 displays the final developed stage-frequency data for the project analysis for Years 2020 and 2070 conditions. The table contains stage-frequency data for all 7 design reaches.

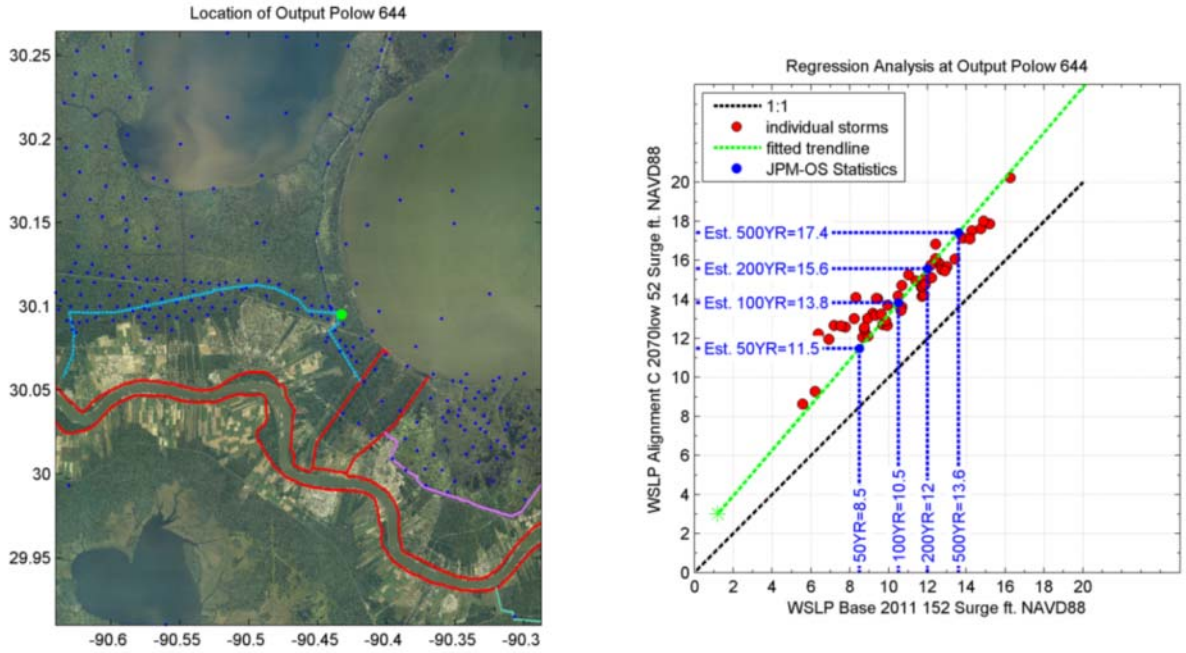


Figure 8 Comparison of Project 152 Base 2011 storm surge values and 52 Alignment C 2070 Low SLR peak storm surge values at Reach 5 of the project levee

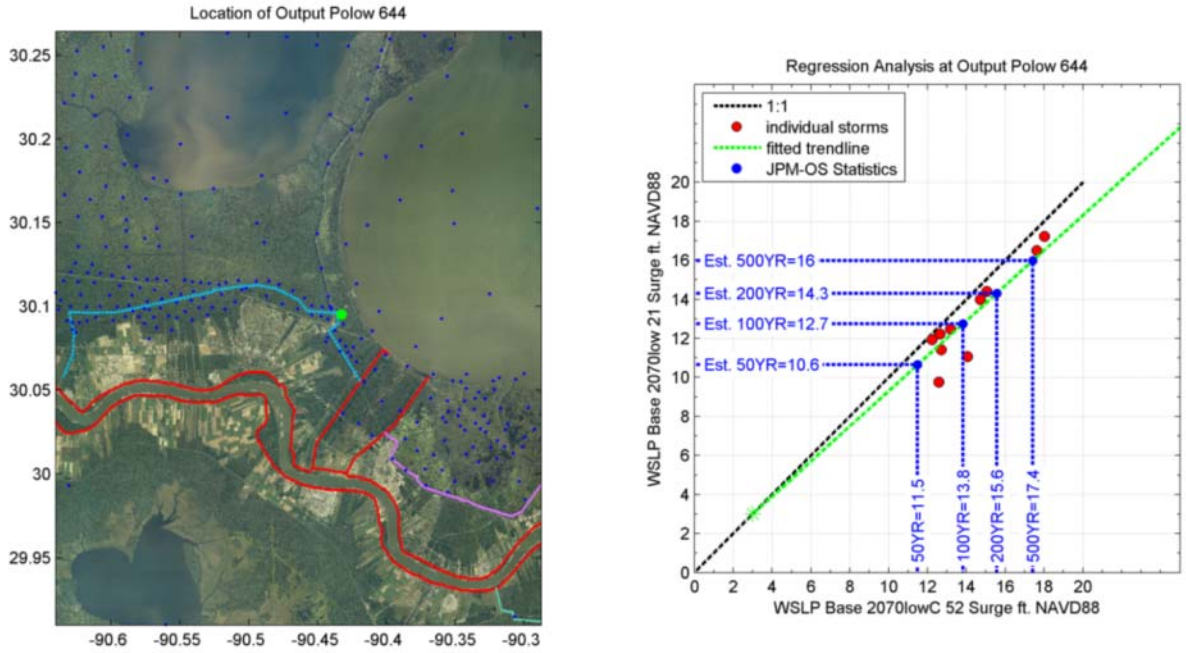


Figure 9 Comparison of 52 Alignment C 2070 Low SLR storm surge values and Project 21 Base 2070 Low SLR peak storm surge values at Reach 5 of the project levee

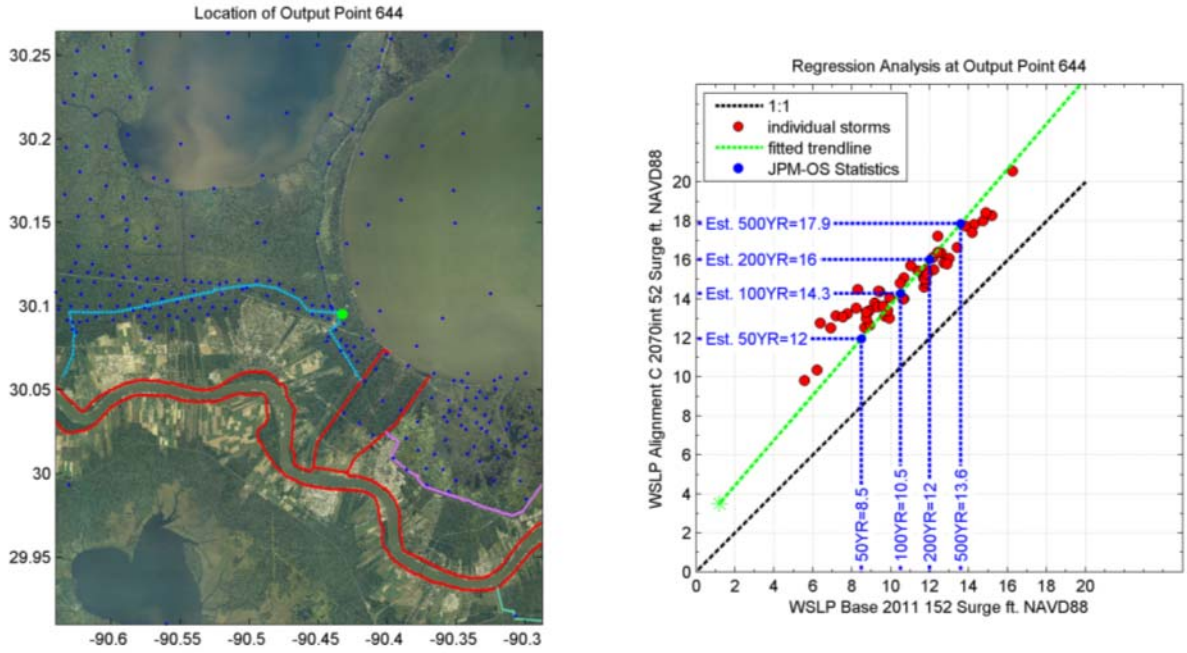


Figure 10 Comparison of 152 Base 2011 storm surge values and 52 Alignment C 2070 Intermediate SLR peak storm surge values at Reach 5 of the project levee

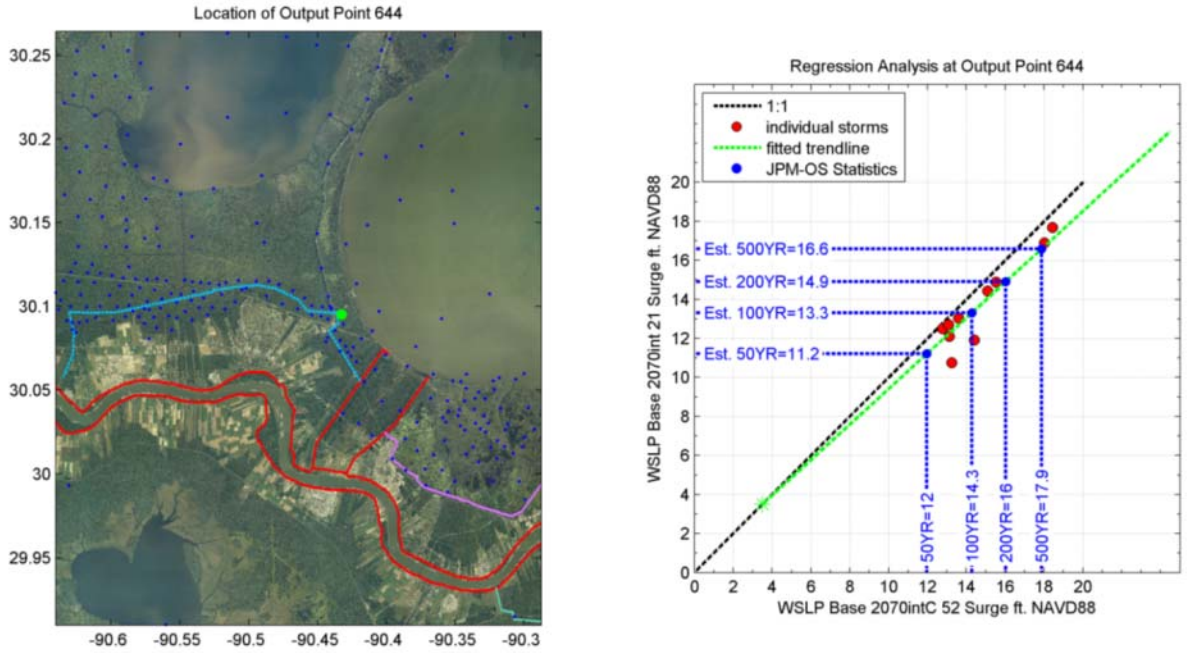


Figure 11 Comparison of 52 Alignment C 2070 Intermediate SLR storm surge values and 21 Base 2070 Intermediate SLR peak storm surge values at Reach 5 of the project levee

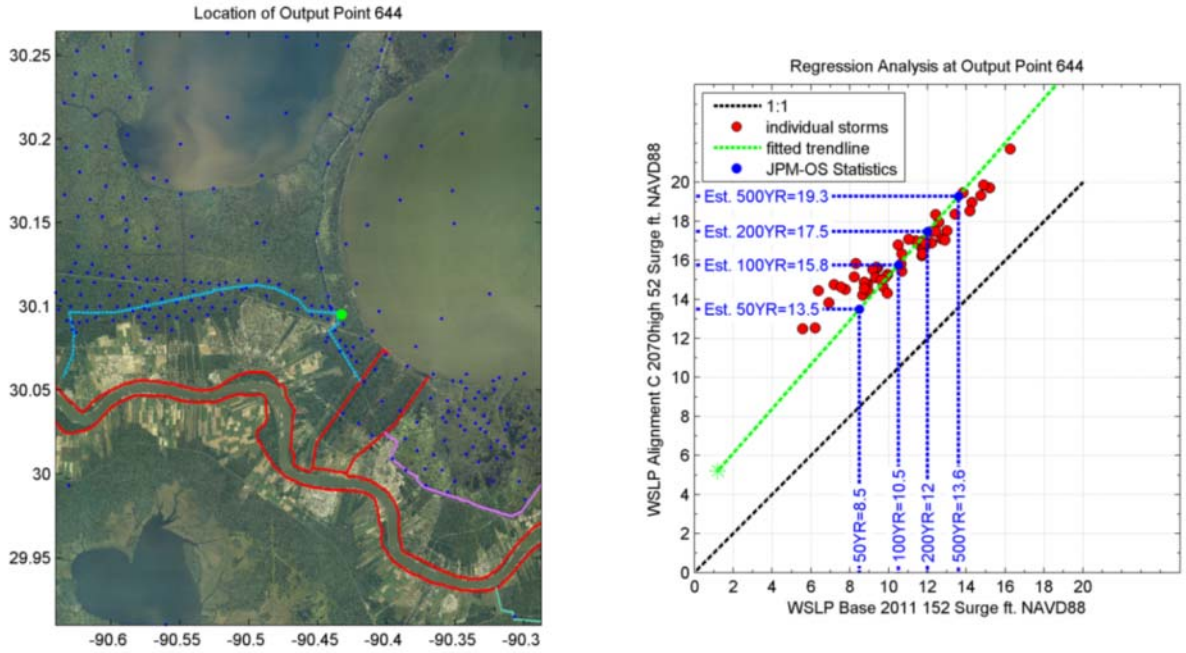


Figure 12 Comparison of 152 Base 2011 storm surge values and 52 Alignment C 2070 High SLR peak storm surge values at Reach 5 of the project levee

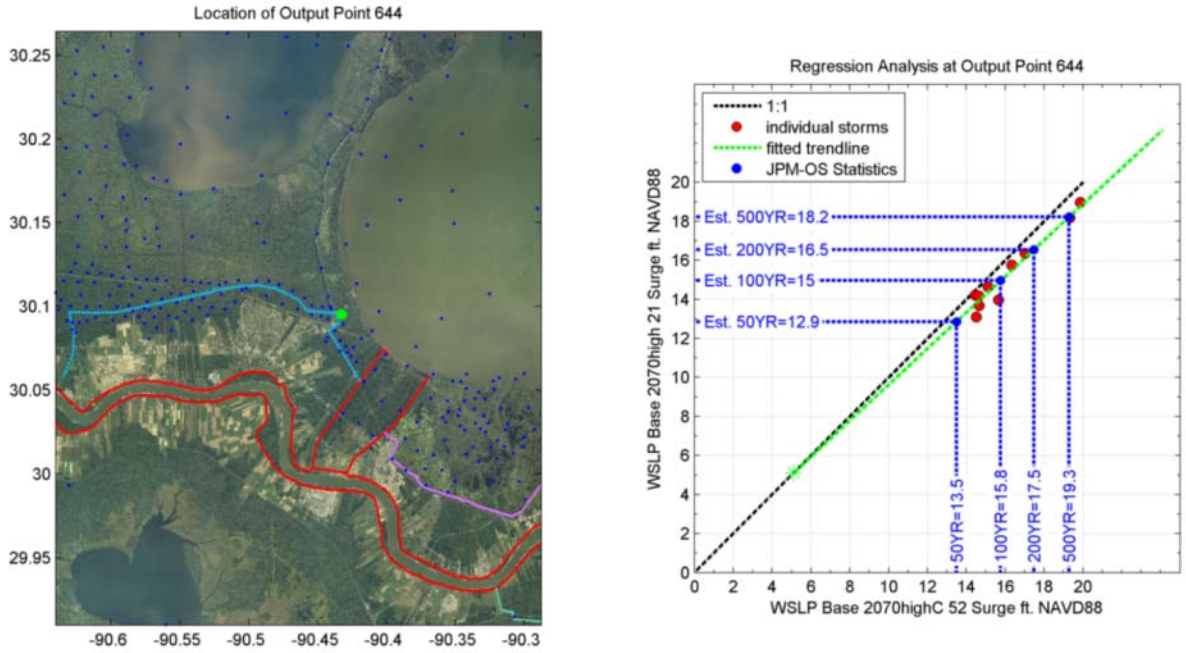


Figure 13 Comparison of 52 Alignment C 2070 High SLR storm surge values and 21 Base 2070 High SLR peak storm surge values at Reach 5 of the project levee

Table 7 Final stage frequency estimates for the WSLP levee design

			Without Project Surge Elevation (ft. NAVD88)				With Project / Alignment C Surge Elevation (ft. NAVD88)				Difference (ft. / %)							
Condition	Reach ID	ADCIRC Output Point	50YR	100YR	200YR	500YR	50YR	100YR	200YR	500YR	50YR		100YR		200YR		500YR	
2020 int	1	534	4.5	**5.7**	6.6	7.8	4.5	**5.7**	6.6	7.9	0.0	1%	**0.0**	**1%**	0.0	1%	0.1	1%
2020 int	2	439	5.5	**6.7**	7.8	9.1	5.9	**7.2**	8.4	9.9	0.4	7%	**0.5**	**7%**	0.6	11%	0.8	9%
2020 int	3	337	6.8	**8.1**	9.1	10.1	7.1	**8.5**	9.5	10.6	0.3	5%	**0.4**	**4%**	0.5	7%	0.5	5%
2020 int	4	365	8.0	**9.6**	10.8	12.1	9.1	**10.9**	12.3	13.8	1.1	13%	**1.3**	**12%**	1.5	17%	1.7	14%
2020 int	5	644	8.7	**10.6**	12.1	13.7	9.9	**12.2**	13.9	15.8	1.2	14%	**1.6**	**13%**	1.8	19%	2.1	15%
2020 int	6	117	10.4	**12.1**	13.4	14.6	10.5	**12.2**	13.5	14.7	0.1	1%	**0.1**	**1%**	0.1	1%	0.1	1%
2020 int	7	132	10.2	**11.9**	13.2	14.5	10.3	**12.0**	13.3	14.6	0.1	1%	**0.1**	**1%**	0.1	1%	0.1	1%
2070 low	1	534	8.3	**10.3**	11.9	14.1	8.4	**10.4**	12.1	14.3	0.1	1%	**0.1**	**1%**	0.2	2%	0.2	2%
2070 low	2	439	9.3	**11.2**	12.9	14.9	9.7	**11.7**	13.5	15.7	0.4	4%	**0.5**	**4%**	0.6	7%	0.8	6%
2070 low	3	337	10.0	**11.8**	13.1	14.5	10.4	**12.2**	13.6	15.0	0.3	3%	**0.4**	**3%**	0.5	5%	0.5	4%
2070 low	4	365	9.3	**10.8**	12.0	13.2	11.0	**12.9**	14.4	16.0	1.7	18%	**2.1**	**18%**	2.4	22%	2.8	19%
2070 low	5	644	10.7	**12.7**	14.3	16.0	11.5	**13.8**	15.6	17.4	0.8	8%	**1.1**	**8%**	1.3	11%	1.4	9%
2070 low	6	117	12.6	**14.4**	15.8	17.1	12.6	**14.4**	15.8	17.1	0.0	0%	**0.0**	**0%**	0.0	0%	0.0	0%
2070 low	7	132	13.2	**15.2**	16.7	18.2	13.2	**15.2**	16.7	18.2	0.0	0%	**0.0**	**0%**	0.0	0%	0.0	0%
2070 int	1	534	9.0	**11.1**	12.9	15.1	9.1	**11.2**	12.9	15.2	0.0	0%	**0.0**	**0%**	0.1	1%	0.1	1%
2070 int	2	439	10.0	**12.0**	13.8	15.9	10.4	**12.5**	14.4	16.6	0.4	3%	**0.5**	**3%**	0.5	5%	0.7	5%
2070 int	3	337	10.6	**12.4**	13.8	15.2	11.0	**12.9**	14.3	15.8	0.4	3%	**0.5**	**3%**	0.5	5%	0.6	4%
2070 int	4	365	11.1	**13.0**	14.4	15.9	11.5	**13.4**	14.9	16.5	0.4	3%	**0.4**	**3%**	0.5	4%	0.6	4%
2070 int	5	644	11.2	**13.3**	14.9	16.6	12.0	**14.3**	16.0	17.9	0.8	7%	**1.0**	**7%**	1.1	9%	1.3	8%
2070 int	6	117	12.9	**14.7**	16.1	17.4	13.0	**14.9**	16.2	17.5	0.1	1%	**0.1**	**1%**	0.1	1%	0.2	1%
2070 int	7	132	13.6	**15.5**	17.0	18.5	13.6	**15.6**	17.1	18.6	0.1	1%	**0.1**	**1%**	0.1	1%	0.1	1%
2070 high	1	534	11.3	**13.6**	15.5	18.0	11.2	**13.5**	15.4	17.9	-0.1	-1%	**-0.1**	**-1%**	-0.1	-1%	-0.1	-1%
2070 high	2	439	12.2	**14.4**	16.3	18.6	12.5	**14.7**	16.6	19.0	0.2	2%	**0.3**	**2%**	0.4	3%	0.4	3%
2070 high	3	337	12.7	**14.6**	16.0	17.5	13.0	**14.9**	16.4	17.9	0.3	2%	**0.4**	**2%**	0.4	3%	0.5	3%
2070 high	4	365	12.8	**14.7**	16.1	17.6	13.0	**15.0**	16.4	18.0	0.2	2%	**0.3**	**2%**	0.3	2%	0.4	2%
2070 high	5	644	12.9	**15.0**	16.5	18.2	13.5	**15.8**	17.5	19.3	0.6	5%	**0.8**	**5%**	0.9	7%	1.1	6%
2070 high	6	117	14.3	**16.1**	17.4	18.6	14.5	**16.3**	17.6	18.9	0.2	1%	**0.2**	**1%**	0.2	1%	0.2	1%
2070 high	7	132	14.9	**16.8**	18.2	19.7	15.0	**16.9**	18.4	19.9	0.1	1%	**0.1**	**1%**	0.2	1%	0.2	1%

Wave Conditions

Figure 14 displays peak significant wave heights from the 2011 Base Condition and the Year 2020 Alignment C condition. The raw STWAVE significant wave heights at point 644 (also known as Reach 5) are unrealistically high given the conditions surrounding the project area. STWAVE does not incorporate the effects of this vegetation. In the model, it was apparent that larger waves that form in Lake Pontchartrain are allowed to propagate to the levee. In reality, this propagation will not occur because the vegetation is simply too thick and too tall to allow it.

Figure 15 displays an aerial image of the project area. Currently, approximately one mile of dense canopy exists between Lake Pontchartrain and the most exposed portion of the project levee. This canopy is not accounted for in the Steady State Spectral Wave (STWAVE) model, allowing unrealistic larger waves to occur in the modeling.

Based on engineering judgment, the significant wave height and peak wave period used for the levee design are the minimum recommended wave height/wave period for coastal structure. For existing conditions, the significant wave heights are set to 1.5 ft. and the peak wave periods are set to 2.5 sec. For future conditions, the significant wave heights are set to 2.5 ft. and the peak wave periods are set to 3.0 sec.

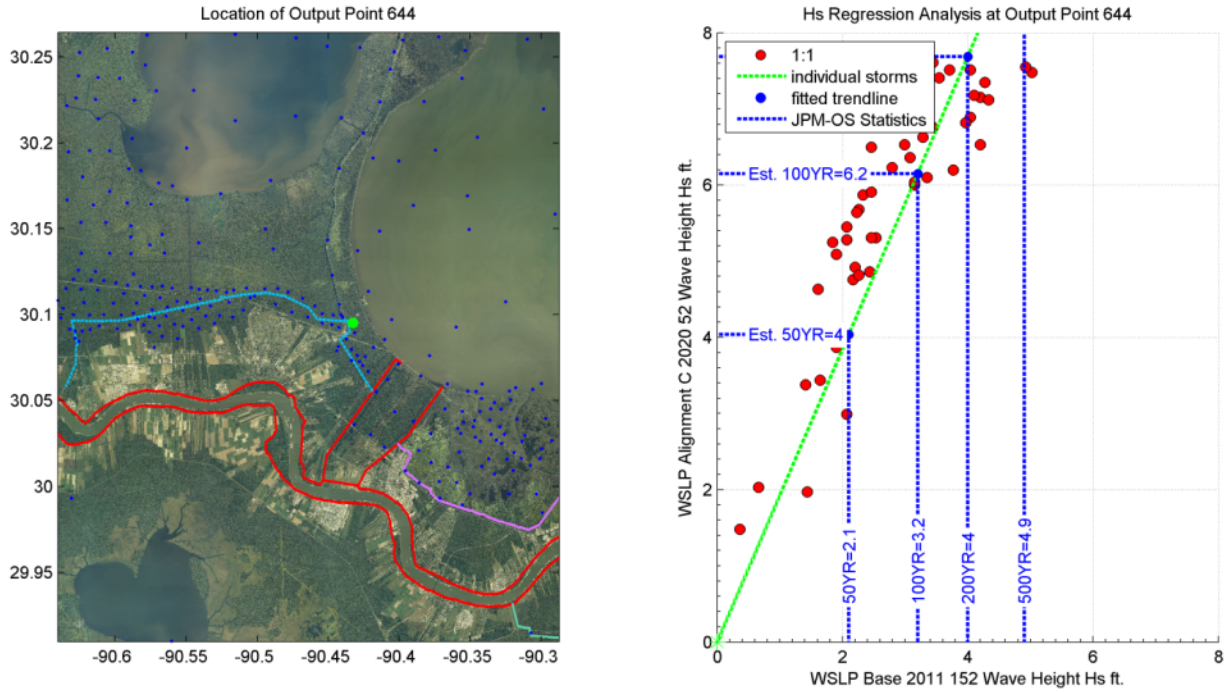


Figure 14 Wave Heights for 2011 Base Condition and Year 2020 Alignment C Condition

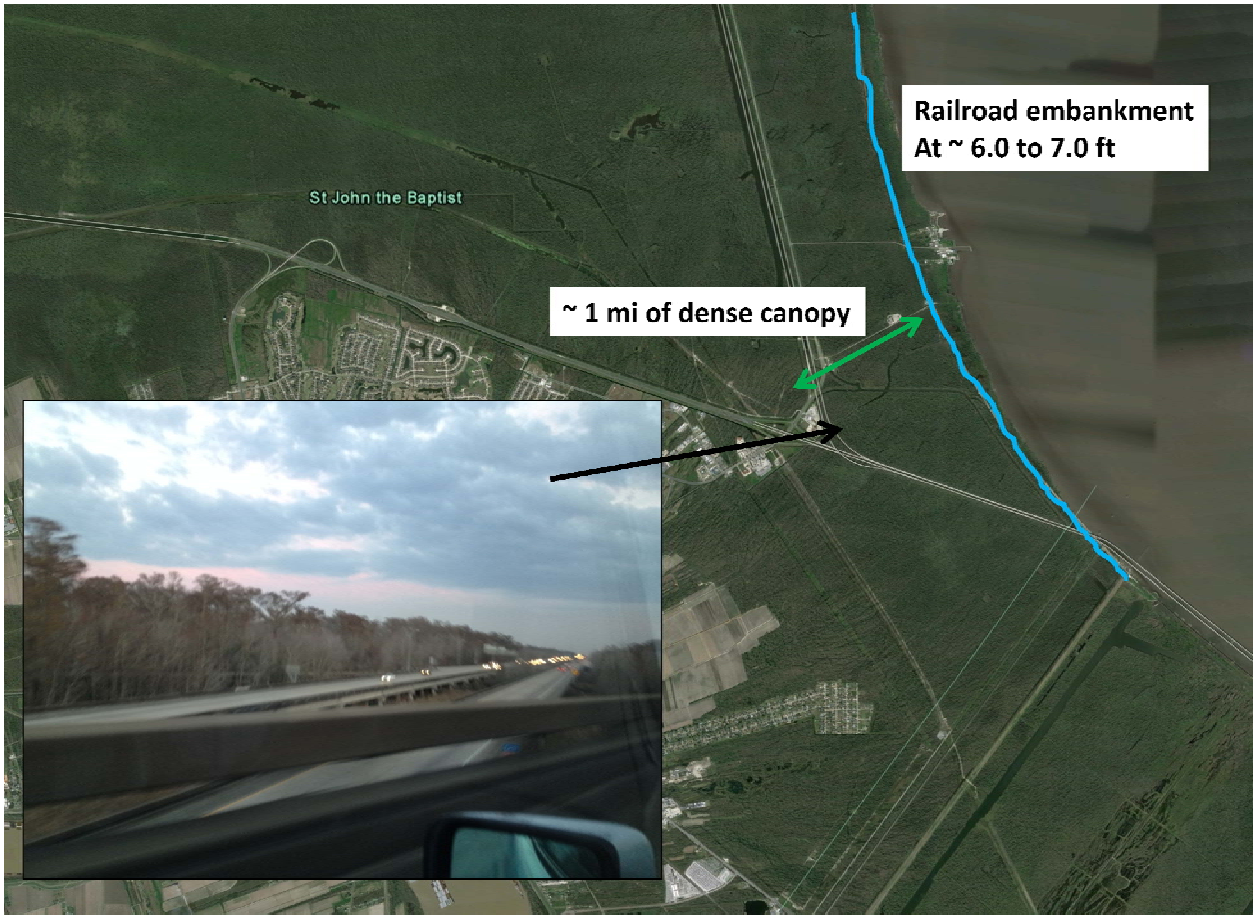


Figure 15 Recommended Alignment with Dense Canopy

Levee Design

The following section describes how the final levee design elevations were determined for the project for Year 2020 and Year 2070 conditions for the 50yr, 100yr and 200yr hydraulic boundary conditions.

The hydraulic and geometric parameters in the levee design approach are uncertain. For instance, there are errors in the computed surge elevation near the levees / floodwalls by the ADCIRC / STWAVE models. The coefficients of the empirical overtopping equations are calibrated against laboratory and field experiments and are inherently uncertain. It is believed that the uncertainty in these parameters should be taken into account in the design process to come up with a robust design. This section describes the method used which accounts for uncertainties in water elevations and waves, and computes the overtopping rate with state-of-the-art formulations. The objective of this method is to ensure that overtopping criteria can be met with a certain level of confidence due to the uncertainties.

A common way of dealing with uncertainties is the application of a Monte Carlo analysis. In the Monte Carlo analysis, the overtopping algorithm is repeated to compute the overtopping rate many times. Based on these outputs, a statistical distribution can be derived from the resulting overtopping rates. The parameters that are included in the Monte Carlo analysis are the 1% surge elevation, wave height and wave period. Uncertainties in the geometric parameters are not included; it is assumed that the proposed heights and slopes in the final design document are minimum values that will be constructed.

To determine the overtopping rate in the Monte Carlo analysis, the probabilistic overtopping formulations from Van der Meer are applied for levees (see text box below) and the Franco & Franco formulation for floodwalls. Besides the geometric parameters (levee height and slope), hydraulic input parameters for determination of the overtopping rate in Equations 1 and 2 are the water elevation (ζ), the significant wave height (Hs) and the peak wave period (Tp).

Van der Meer overtopping formulations

The overtopping formulation from Van der Meer reads (TAW, 2002):

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_0 \exp\left(-4.75\frac{R_c}{H_{m0}}\frac{1}{\xi_0\gamma_b\gamma_f\gamma_\beta\gamma_v}\right) \quad (1)$$

$$with \quad \max imum: \quad \frac{q}{\sqrt{gH_{m0}^3}} = 0.2\exp\left(-2.6\frac{R_c}{H_{m0}}\frac{1}{\gamma_f\gamma_\beta}\right)$$

With:

q : average overtopping rate [cfs/ft]

g : gravitational acceleration [ft/s2]

Hm0 : wave height at toe of the structure [ft]

ξ0: surf similarity parameter [-]

α : slope [-]

Rc : freeboard [ft]

γ : coefficient for presence of berm (b), friction (f), wave incidence (β), vertical wall (v)

The surf similarity parameter ξ0 is defined herein as $\xi_0 = \tan\alpha / \sqrt{s_0}$ with α the angle of slope and s_0 the wave steepness. The wave steepness follows from $s0 = 2\pi H_{m0}/(g\,Tm_{-10}^2)$. The coefficients -4.75 and -2.6 in Equation 1 are the mean values. The standard deviations of these coefficients are equal to 0.5 and 0.35, respectively and these errors are normally distributed (TAW, 2002). The reader is referred to TAW (2002) for definitions of the various coefficients for presence of berm, friction, wave incidence, vertical wall.

Equation 1 is valid for $\xi_0 < 5$ and slopes steeper than 1:8. For values of $\xi_0 > 7$ the following equation is proposed for the overtopping rate:

$$\frac{q}{\sqrt{gH_{m0}^3}} = 10^{-0.92}\exp\left(-\frac{R_c}{\gamma_f\gamma_\beta H_{m0}(0.33+0.022\xi_0)}\right) \quad (2)$$

The overtopping rates for the range $5 < \xi_0 < 7$ are obtained by linear interpolation of Equation 1 and 2 using the logarithmic value of the overtopping rates. For slopes between 1:8 and 1:15, the solution should be found by iteration. If the slope is less than 1:15, it should be considered as a berm or a foreshore depending on the length of the section compared to the deep water wavelength. The coefficients -0.92 is the mean value. The standard deviation of this coefficient is equal to 0.24 and the error is normally distributed (TAW, 2002).

Figure 16 graphically shows the overtopping for a levee and floodwall situation including the most relevant parameters.

In the design process, the best estimate 1% values is used for these parameters from the JPM-OS method (White Paper, 2007); uncertainty in these values exists. Resio (2007) has provided a method to derive the standard deviation in the 1% surge elevation. Standard deviation values of 10% of the average significant wave height and 20% of the peak period were used (Smith, 2006, pers. comm.). In absence of data, all uncertainties are assumed to be normally distributed.

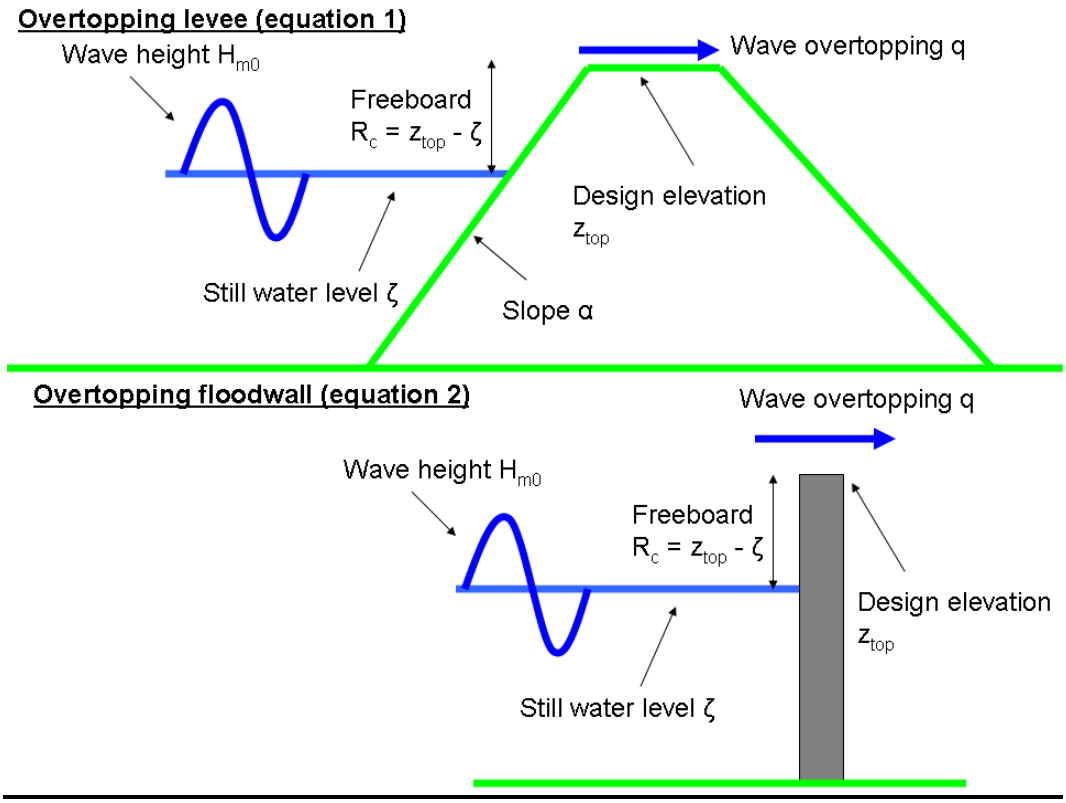


Figure 16 Definitions for Overtopping for Levee and Floodwall

The Monte Carlo Analysis is executed as follows:

1. Draw a random number between 0 and 1 to set the exceedance probability (p).
2. Compute the water elevation from a normal distribution using the mean 1% surge elevation and standard deviation as parameters and with an exceedance probability (p).
3. Draw a random number between 0 and 1 to set the exceedance probability (p).
4. Compute the wave height and wave period from a normal distribution using the mean 1% wave height/wave period and the associated standard deviation and with an exceedance probability (p).
5. Repeat steps 3. and 4. above for the three overtopping coefficients independently.
6. Compute the overtopping rate for these hydraulic parameters and overtopping coefficients determined in steps 2., 4. and 5. above using the Van der Meer overtopping formulations for levees or the Franco & Franco equation for floodwalls (see Equations 1 and 2 in the textbox).
7. Repeat Steps 1. through 5. above a large number of times. (N)
8. Compute the 50% and 90% confidence limit of the overtopping rate. (i.e., q_{50} and q_{90})

The procedure is implemented in the numerical software package MATLAB because it is a computationally intensive procedure. MATLAB is a high-level technical computing language and interactive environment for algorithm development, data visualization, data analysis and numeric computation.

Results

Figure 17 displays an example of MATLAB Monte Carlo-based output for the 50yr design of segment 1 for Year 2020 conditions with a 1:4 levee slope. The final 50yr design elevation at 7.0 ft. NAVD88 was selected to limit the overtopping rates below 0.01 cfs/ft. with 50% assurance, and limit the overtopping rate below 0.10 cfs/ft. with 90% assurance. For a robust design, the Monte Carlo-based design methodology accounts for the uncertainty of the hydraulic boundary conditions, and the uncertainty in the Van der Meer overtopping equations. Table 8 contains the final design elevations for the 50yr, 100yr and 500yr conditions for all 4 SLR scenarios. Design elevations are determined for both 1:3 and 1:4 levee slopes. Figure 18 displays the 7 design reaches for the project.

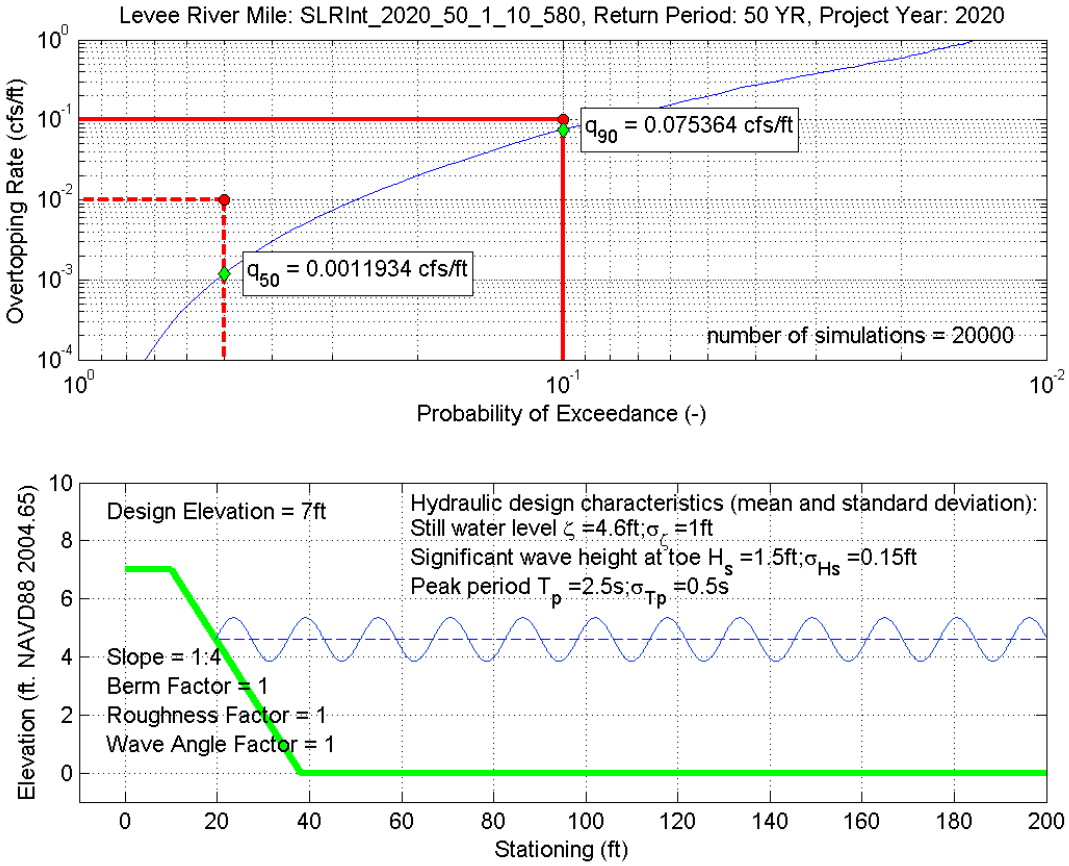


Figure 17 Monte Carlo-Based Hydraulic Design Output for Reach 1, 50yr, Year 2020

Table 8 Final Design Elevations (All elevations are in ft. NAVD88)

Levee Section	Reach	ID	Design Year	50YR Levee Elevation with 1:3 slope	100YR Levee Elevation with 1:3 slope	200YR Levee Elevation with 1:3 slope	50YR Levee Elevation with 1:4 slope	100YR Levee Elevation with 1:4 slope	200YR Levee Elevation with 1:4 slope
2020int_50_1_534	1	534	2020 int	7	8.5	10	6.5	8	9.5
2020int_50_2_439	2	439	2020 int	8.5	10	11.5	8	9.5	11
2020int_50_3_337	3	337	2020 int	9.5	11.5	12.5	9.5	11	12.5
2020int_50_4_365	4	365	2020 int	11.5	14	15.5	11.5	13.5	15
2020int_50_5_644	5	644	2020 int	12.5	15	17	12	14.5	16.5
2020int_50_6_117	6	117	2020 int	13	15	16.5	12.5	14.5	16.5
2020int_50_7_132	7	132	2020 int	13	15	16.5	12.5	14.5	16
2070low_50_1_534	1	534	2070 low	12.5	15	17	12	14	16
2070low_50_2_439	2	439	2070 low	14	16	18	13	15.5	17.5
2070low_50_3_337	3	337	2070 low	14.5	16.5	18.5	14	16	17.5
2070low_50_4_365	4	365	2070 low	15.5	17.5	19	14.5	16.5	18.5
2070low_50_5_644	5	644	2070 low	16	18.5	20.5	15	17.5	19.5
2070low_50_6_117	6	117	2070 low	17	19	20.5	16	18	19.5
2070low_50_7_132	7	132	2070 low	17.5	19.5	21.5	16.5	19	20.5
2070int_50_1_534	1	534	2070 int	13.5	16	17.5	12.5	15	17
2070int_50_2_439	2	439	2070 int	14.5	17	19	14	16	18.5
2070int_50_3_337	3	337	2070 int	15.5	17.5	19	14.5	16.5	18.5
2070int_50_4_365	4	365	2070 int	16	18	19.5	15	17	19
2070int_50_5_644	5	644	2070 int	16.5	19	21	15.5	18	20
2070int_50_6_117	6	117	2070 int	17.5	19.5	21	16.5	18.5	20
2070int_50_7_132	7	132	2070 int	18	20	22	17	19.5	21
2070high_50_1_534	1	534	2070 high	15	18	20.5	14	17	19.5
2070high_50_2_439	2	439	2070 high	16	19	22	15.5	18.5	21
2070high_50_3_337	3	337	2070 high	17	19.5	21.5	16	18.5	21
2070high_50_4_365	4	365	2070 high	17	19.5	21.5	16	18.5	20.5
2070high_50_5_644	5	644	2070 high	17.5	20.5	22.5	16.5	19.5	21.5
2070high_50_6_117	6	117	2070 high	18.5	21	22.5	17.5	20	22
2070high_50_7_132	7	132	2070 high	19	21.5	23.5	18	20.5	22.5

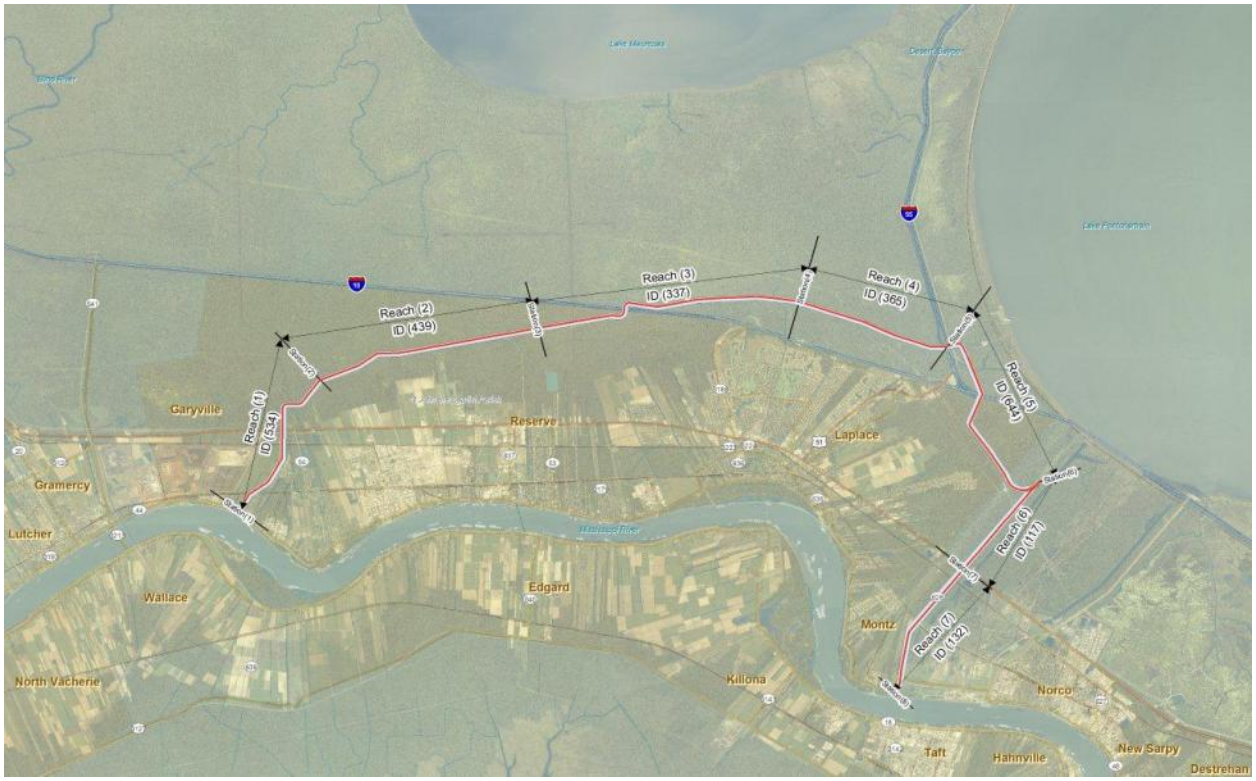


Figure 18 Project Levee Reaches

Sub-planning Stage Frequency

In the coastal area, the risk of flooding is dominated by storm surge. Inland areas might be more prone to flooding by heavy rainfall. In the analysis, both hazards have been evaluated. In order to conduct the economic analysis, the 2-, 5-, 10-, 25-, 50-,100-, 200- and 500-year stages have been developed for each of the sub-planning units in the study area.

The storm surge modeling does not include the effects of rainfall. The storm surge modeling is not capable of producing stages for higher frequency events such as the 2-, 5-, 10- and 25-year events. The suite of storms selected for the modeling is selected to produce stage frequencies for 50-year events and above. Therefore, for higher frequency events, it is preferable to use gage data for developing the stage-frequency. However, no long term gage data is available for the project area.

For the project area sub-planning units, the stage-frequency data developed through the hydrologic modeling were combined with the stage-frequency data developed through the surge modeling so as to develop complete stage-frequency data for the economic analysis.

Tables that contain the combined stage-frequency curves for the 2-, 5-, 10-, 25-, 50-, 100-, 200- and 500-year events for each sub-planning unit (for with- and without-project) were provided for economic analysis.

Induced Flooding

Stage-frequency data were developed for each of the sub-basins in the economic analysis. Figure 19 displays the 100-year stillwater elevations for the Base Year 2020 condition. The values at these locations include the effects of rainfall and surge as discussed in the previous section. Figure 20 displays the 100-year stillwater elevations for the with-project Year 2020 condition. Figure 21 displays the difference in the 100-year stillwater elevations between the with- and without-project condition for Year 2020. A positive number represents an increase due to the Alignment C condition. Figure 22 displays the difference in the 100-year stillwater elevations between the with- and without-project condition for Year 2070 with intermediate SLR.

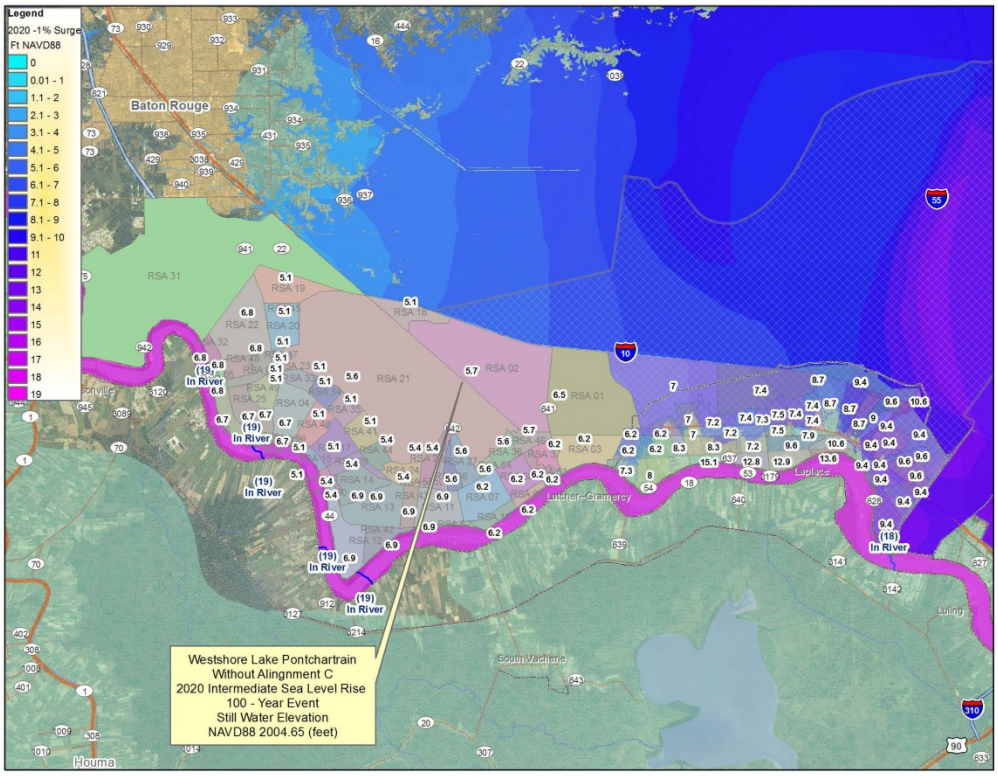


Figure 19 100-Year Stillwater Elevations for Year 2020-Intermediate SLR Condition – Without-Project

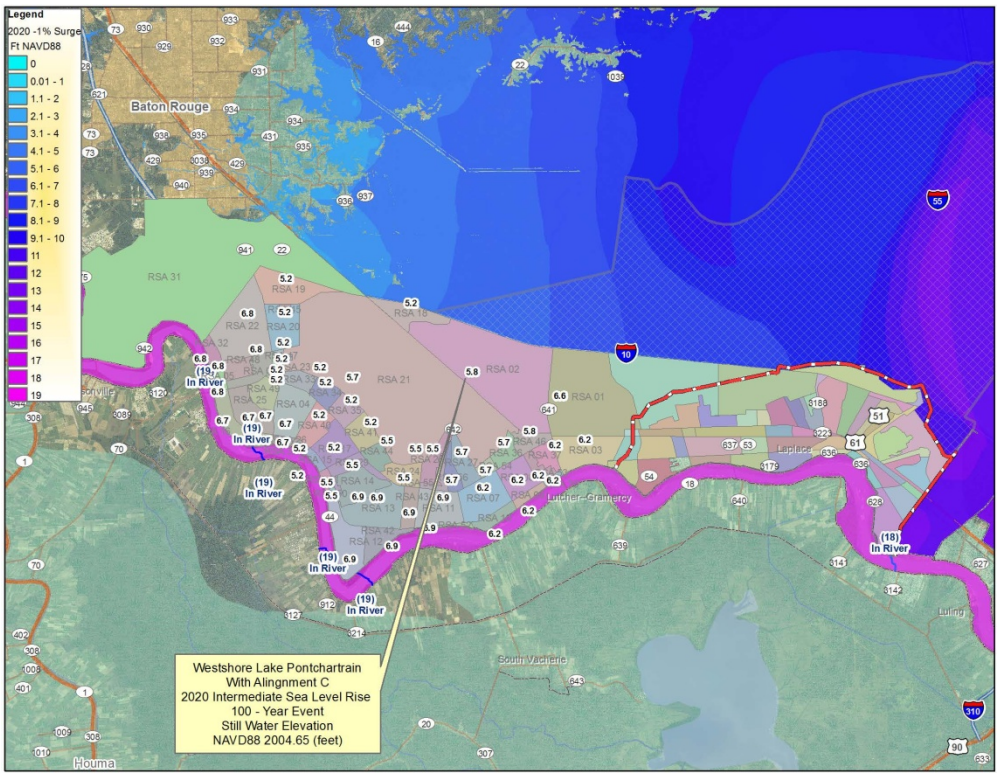


Figure 20 100-Year Stillwater Elevations for Year 2020-Intermediate SLR Condition – With Alignment C

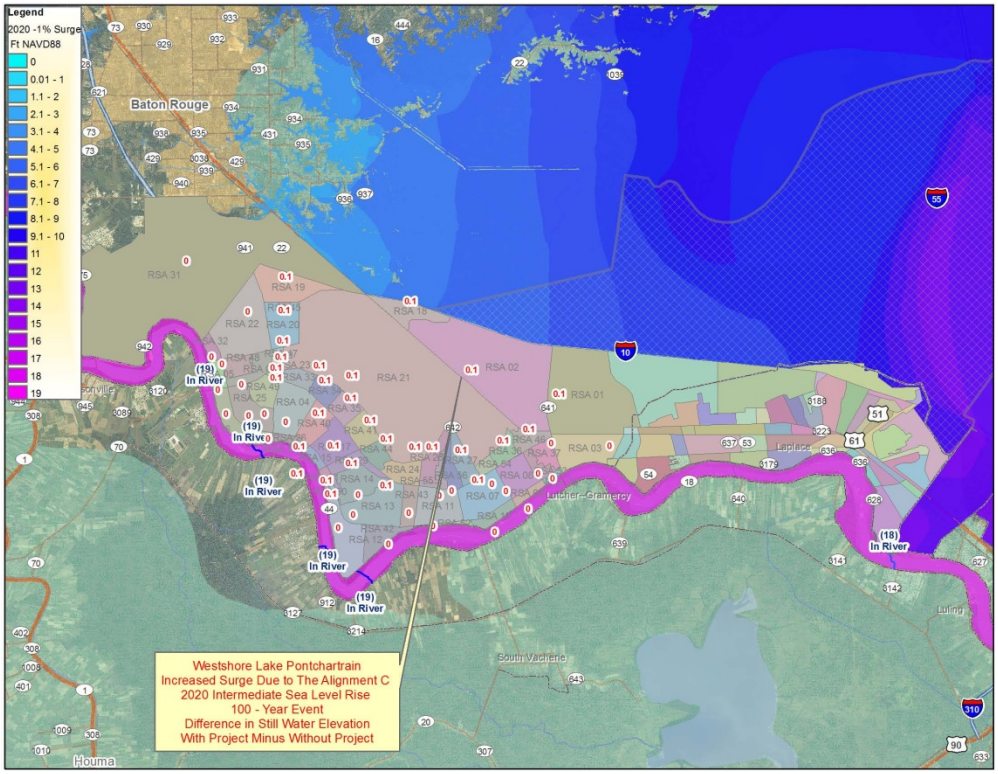


Figure 21 Difference Between With- and Without-Project for Year 2020-Intermediate SLR conditions

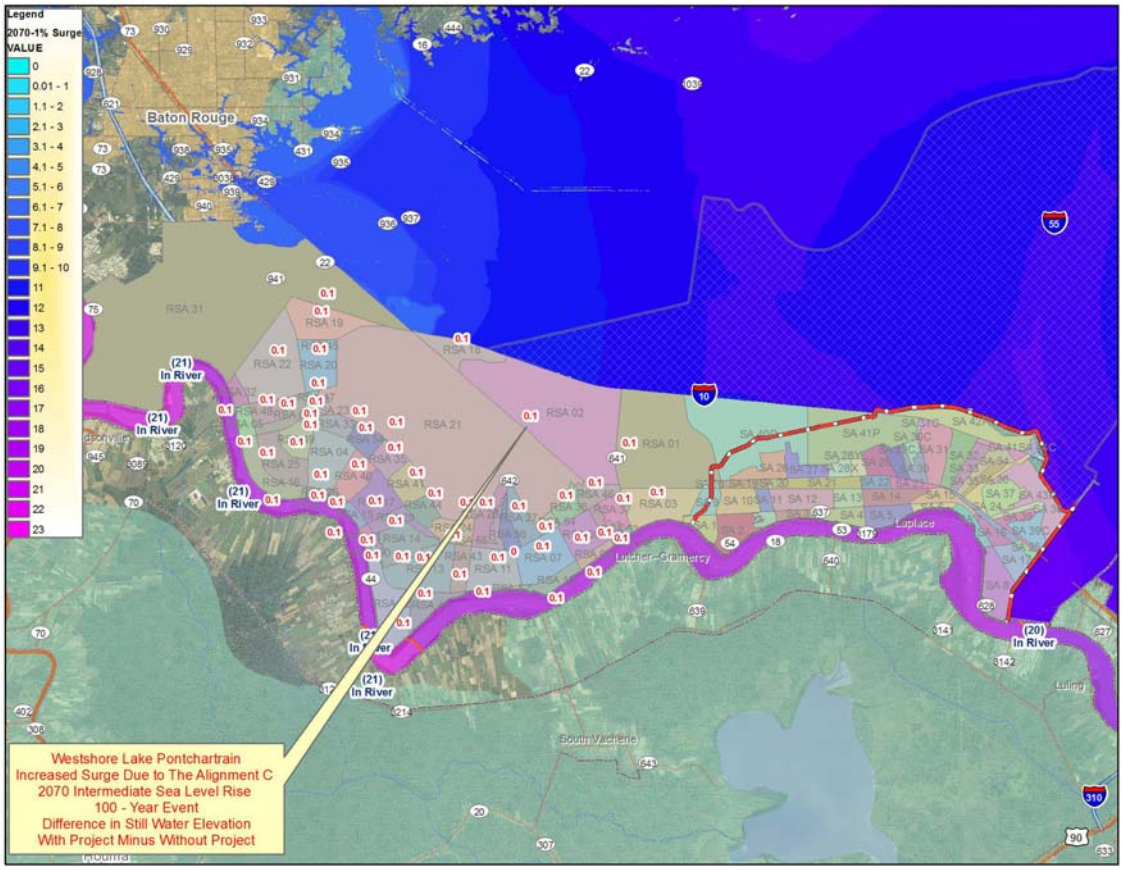


Figure 22 Difference Between With- and Without-Project for Year 2070-Intermediate SLR conditions

Geotechnical

Background and Furnished Information. As described at the beginning of this Appendix, the three levee alignments (A, C and D) were evaluated as part of the screening level effort. Levee cross section templates were developed based upon the proposed levee elevations and the geologic soil reaches. The analyses were based on Proposed Levee Elevations applicable to multiple alignments and for 11 soil reaches. Levee settlement estimates, recommended levee overbuild elevations and the number of projected levee lifts for Proposed Levee Elevations at Years 2020 and 2070 were also developed.

With Alignment C designated as the Recommended Plan, revised hydraulic design criteria were developed to meet increased intermediate sea level rise (SLR) elevations which resulted in increasing the Year 2020 and Year 2070 Proposed Levee Elevations to elevations greater than those used for screening analyses. A summary of the revised hydraulic design criteria for applicable soil reaches in Alignment C is shown in Table 9. These levels consider the previous-analyzed levee considering 1V:3H side slopes and no wave berms.

TABLE 9: REVISED ALIGNMENT C HYDRAULIC DESIGN CRITERIA

SOIL DESIGN REACH	ELEVATION (NAVD88)	
	REVISED Proposed Levee Elevation (2020)	REVISED Proposed Levee Elevation (2070)
1	8.5 / 10	16 / 17
2	10	17
4	11.5	17.5
7	11.5	17.5
8	14 / 15	18 / 19

Application of Soil Design Reaches. As noted in Table 9 above, five of the 11 soil design reaches have been identified as being applicable to Alignment C and the current hydraulic design levels. Selection of the application of these reaches were based on the original soil reach locations, the levee sections developed for the screening study, levee lift construction recommendations, original design elevations and current design elevations. These soil design reaches were then correlated to the 22 design sections previously developed (based upon the original 8 proposed levee elevation reaches, the 7 stillwater elevation reaches and the 10 geologic reaches) for this levee alignment and designated as C-1 through C-22.

Revised Analyses and Modified Recommendations. The revised hydraulic design criteria increased the Proposed Levee Elevations in Year 2020 and Year 2070; prior analyses were reviewed and additional analyses performed to assess where modifications to previous recommendations were necessary.

Considering limited changes in Proposed Levee Elevations previously analyzed and original computed factors of safety, it was recommended that the templates developed for soil reaches 1, 2, 4 and 7 be utilized to evaluate the new design grades. Soil Reach 8 for the Year 2020 Proposed Levee Elevation of El. +14 was also still applicable. The stability berm geometries and geosynthetic fabric lengths shown in previous analyses do not require further modifications and the recommended overbuild remains as 1.5 feet for these Year 2020 sections.

In Soil Reach 8 where the Year 2020 Proposed Levee Elevation is at El. +15, additional analyses were performed to evaluate the higher proposed grades. Increased stability berm dimensions and increased geosynthetic reinforcement fabric length were recommended in order to achieve the minimum required factors of safety. The revised dimensions and geometry should be applied to Alignment C for stations previously identified as C-1 through C-5.

As noted previously, stability analyses were not conducted for the Year 2070 Proposed Levee Elevations. Rather, sufficient gain-in-strength was assumed to occur over the life of the levee and as subsequent lifts are placed. In general, the change in grade between the new Year 2020 Proposed Levee Elevations and new Year 2070 Proposed Levee Elevations varies between 5 and 8 feet. The original change in grade averaged about 5 feet for the previous analyses. It should be noted that the 8-ft. grade change occurs where the highest factors of safety are computed for the Year 2020 Proposed Levee Elevations.

In general, the lift schedule described in the screening analysis should be followed, but the thickness of the lifts at Years 2030, 2045 and 2060 will be increased where the net grade change is increased.

Additional Considerations. As previously noted, the limited geotechnical data for this screening study required the development of assumed time-rate of settlement parameters for estimates of lift thickness and lift construction recommendations. However, even these assumptions would not address the stress history and time-rate away from the boring locations. Because Alignment C is located within a previously undeveloped area, additional lifts or increased lift thickness may be required.

Datum and Topography

As discussed in the **Datum and Topography** section of the **Screening Phase (Background) Information** section of this Appendix, all elevations used in the design were NAVD88-2004.65 datum. Any elevation data not in the NAVD88-2004.65 datum was adjusted prior to use.

Civil / Structural Design

The same set of standard details developed during the screening analysis to provide a schematic elevation view of the typical pump station T-Wall, Interstate T-Wall, Roadway/Railroad Floodgate T-Wall and Pipeline T-Wall were utilized for the Recommended Plan.

The revised design levee elevations for Alignment C were reduced from eight during the screening analysis to five in the recommended plan analysis. It was decided to maintain the same 22 levee design section limits in order to correlate and compare the screening and the recommended plan design sections. The design sections were adjusted based upon the revised geotechnical levee template, the proposed connector canal, and the proposed frontal ditch. A frontal ditch was added to the levee footprint to minimize wetland impacts. Typical Section drawings of the alignment can be found in Annex 3 of this Appendix.

As was done during the screening analysis, special attention was made to locate the right-of-way limits for the proposed levee sections to coincide with the existing rights-of-way from highways, pipelines, etc. to avoid remainder parcels that were nonfunctional to the original owner. This was accomplished since the growth of the levee template and frontal ditch was toward the unprotected side of the project and the highway and pipeline rights-of-way are on the protected side of the project.

Access Routes and Staging Areas. Potential access routes and staging areas have been identified during the feasibility-level design of the recommended plan alignment. Potential access roadways were identified by using aerial imagery to identify existing features along Alignment C. The aerial imagery utilized for the evaluation consisted of Google Earth imagery dated 05 March 2013 and 2004 Digital Orthophoto Quarter Quadrant (DOQQ) imagery available from the Louisiana State University Atlas Database website (http://atlas.lsu.edu). The Google Earth imagery was used to identify potential access points and the 2004 DOQQ was used to document the potential access points on the drawings.

Alignment C is primarily through wetland areas and adjacent to a major pipeline corridor. While the existing pipeline corridor has already been clear cut and mitigated, the corridor was excluded based upon construction loading being detrimental to existing pipelines.

The next approach was to identify potential access via direct access points, existing access points and new access points in that order of selection hierarchy. Since the proposed alignment crosses existing public roadways such as U.S. Highways 51 and 61, Louisiana Highway 44, Frenier Road and Oak Park Boulevard, direct access to the levee right-of-way could be obtained for construction. Existing access consisting of aggregate and dirt roads were identified along the alignment. There were twelve aggregate and dirt roads identified along the alignment with one being located within Louisiana State lands and the remainder being within what is assumed to be private lands. Actual ownership was not determined but assessed and evaluated from existing large tract ownership maps available to the project design team. Potential new access points consisted of potential new roadways through the wetlands to the levee right-of-way. Typically, these were potential new road extensions of existing aggregate or dirt roadways. There were three potential new access road (extensions) identified from the aerial imagery. This process identified twenty potential access roads for construction of the project.

The twenty potential access roads identified are in excess of what is needed for construction of an 18-mile levee. Some of the potential access roads were selected to form a recommended list of potential access roads based upon the selection criteria described above and the potential haul distances between the access points. The recommended list includes three direct accesses, six existing accesses and three new accesses for a total of twelve access points. A one-acre staging area was allocated for all twelve access points for haul ticket collection and truck wash-down. During the P.E.D. phase of the project, these routes and staging areas will be finalized.

Borrow Sources. Borrow material for this project would come from the Bonnet Carré Spillway. The project design team has reviewed the potential for obtaining all of the required borrow for this project from the spillway. They believe the spillway has adequate clay material available for this project. An alternative borrow pit investigation has not been conducted at this time.

Quantities. Quantities were computed for clearing and grubbing, geotextile, earthwork, aggregate roadway, turf establishment, T-Walls, drainage gates, roadway gates, railroad gates, pump stations and pipeline relocations in the same manner as during the screening evaluation. The quantities for clearing and grubbing, geotextile, earthwork and turf establishment increased based upon the revised levee elevation and template changes. New quantities for access roads and staging areas were computed including clearing, grubbing and aggregate roadway. The revised and new quantities have been included in the MII Cost Estimate.

Relocations

The assumption for Alignment C was that a pipeline floodwall would be required wherever a pipeline crossed the levee footprint. The pipeline would cross through a cutoff wall under the pipeline floodwall. It was decided that the existing carrier line would remain in operation while a bypass line would be constructed through a sleeve in the T-wall cutoff piles. When the bypass would be completed and in place, the switch over-tie in with the existing line then would follow along with the removal of the abandoned pipeline. These assumptions are consistent with the screening level assumptions. For the recommended plan, it was assumed the pipeline would be relocated for the full right-of-way width of the proposed levee to accommodate the proposed protected side canal and the unprotected side ditch. A pipeline relocation length of 600 feet was used versus the widest right-of-way of 541 feet. The costs for relocations have been included in the MII Cost Estimate.

Cost Estimates

The project cost estimate was developed in the MCACES MII cost estimating software and used the standard approaches for a feasibility estimate structure regarding labor, equipment, materials, crews, unit prices, quotes, sub- and prime contractor increases above costs. This philosophy was used wherever practical within the time constraints. It was supplemented with estimating information from other sources where necessary such as quotes, bid data and A/E estimates. The estimate is structured to reflect the project construction tasks performed. The estimate has been subdivided by USACE feature codes and by the 22 levee design reaches (levee and floodwalls), 36 pipeline relocations and 4 pump stations. The cost estimate included consideration of labor rates, materials, equipment, fuel, crew production, relocation, mob/demobilization, field and office overhead, taxes, bonds, engineering, contingencies and escalation. A construction schedule was developed to provide 100-year protection from project design year of 2020 through the project life span of 50 years to Year 2070. Annex 1 to this Appendix contains the Cost Engineering Report, the MII Cost Estimate, the Project Construction Schedule and the Summary Cost Schedule Risk Analysis (CSRA). Annex 2 to this Appendix contains the Detailed CSRA.

References

ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 August 1999.

ER 1110-1-8159, Engineering and Design, DrChecks, 10 May 2001.

ER 1110-1-12, Engineering and Design, Quality Management, 21 July 2006.

EC 1165-2-209, Civil Works Review Policy, 31 January 2010.

EC 1165-2-214, Civil Works Review Policy, 15 December 2012.

ER 1100-2-8162, Incorporating Sea Level Change in Civil Works Programs, 31 December 2013.

Hurricane and Storm Damage Reduction System (HSDDRS), Design Guidelines, USACE, New Orleans District, June 2008.

CECW-CE, Engineering and Construction Bulletin, No. 2004-13, Issued 30 Aug 2004.

EM 1110-2-6056, Standards and Procedures for Referencing Project Elevation Grades to Nationwide Vertical Datums, 31 December 2010.

USACE New Orleans District Guide for Minimum Survey Standards for Performing Topographic, Hydrographic, and Static GPS Control Surveys (Edition 2.1).

Louisiana State Plane Coordinate System South Zone (1702) using North American Datum of 1983 (NAD83) for horizontal datum.

North American Vertical Datum of 1988 Epoch 2004.65 (NAVD88-2004.65) for vertical datum.

ER 1110-1-12, Engineering and Design, Quality Management, dated September 30, 2005.

JPM-OS method (White Paper on Estimating Hurricane Inundation Probabilities for Storm Selection and Statistics Reference (dated 10 June 2007)

Resio (2007)

Smith, 2006, pers. comm.

SCREENING PHASE (BACKGROUND) INFORMATION

The following information below was used in the plan formulation process to identify the tentatively selected plan (TSP) described in the Draft Report. The Draft Report was presented to the public on August 23, 2013. The information below is the same information presented in the Draft Report and does not reflect changes to the TSP recommendation that occurred after the publication of the Draft Report. The information is included to inform the reader of the planning process as it had been conducted up to publication of the Draft Report. After the release of the Draft Report, the team refined the design of the TSP with additional engineering and environmental investigations. This information is presented in the sections above. Based on feasibility level of design and based on comments received following publication of the Draft Report, portions of the TSP was modified. For the full details of the additional planning efforts a brief description of those modifications please see section 3.9 and section of the main report.

Figure 23 displays the 3 alternative alignments that were presented to the public in the August 2013 Draft Report

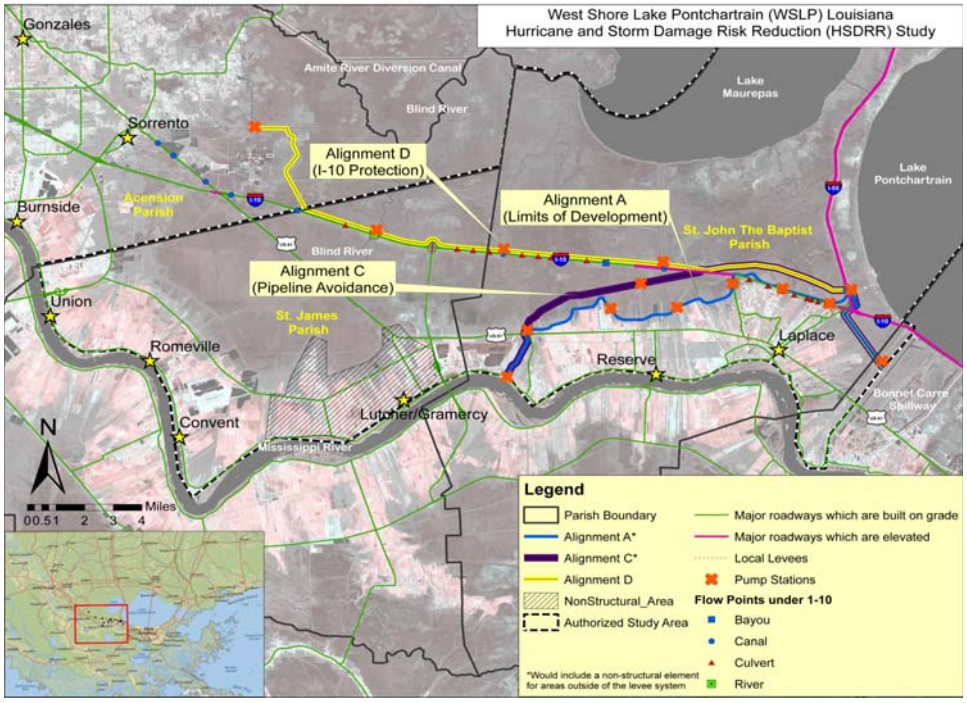


Figure 23: The Three Alternative Alignments

Alternative A

Alternative A starts at the Upper Guide Levee of the Bonnet Carre Spillway in St. Charles Parish, LA (north of the transmission and pipeline corridors), extends west around the I-10/I-55 interstate interchange and ends at the Mississippi River Levee just west of the Hope Canal in St. John the Baptist Parish, LA, a distance of 20.41 miles. The earthen levee generally follows

the wet/dry interface. The following information is based on modeling for a 100-year level of risk reduction in the Baseline Year of 2020 for a period of evaluation of 50 years.

The top of levee elevation (net elevation) for this alignment ranges from El. 13.5 NAVD88 on the eastern reaches of the levee near the Bonnet Carre Spillway and gradually tapering to El. 7.0 NAVD88 as the levee moves west across the project .

Floodwalls

Ten Floodwalls (T-type walls), comprising a total of 4,774 linear feet, range from 10 ft. to 19 ft. in height; the top of wall design elevation is El. 17.0 NAVD88. The floodwalls, for the most part, are located where the alignment runs under I-10 and the I-10/I-55 interchange.

Floodgates

Nine Floodgates, comprising a total of 1,218 linear feet, range from 10 ft. to 19 ft. in height; the top of gate design elevation is El. 17.0 NAVD88. The floodgates, for the most part, are located along the alignment, usually where canals and roads are. Additionally, two 25-ft. wide railroad swing gates (each 11 ft. high) are included for those instances where the levee crosses the railroad.

Drainage Structures

Gravity Drainage Structures (with sluice gates), comprising a total of 240 linear feet, range from 20 ft. to 29 ft. in width. These are located near proposed pumping stations.

Pumping Stations

There are 8 pumping stations located along the alignment. The different sizes (which assumes there is no storage capacity available) are as follows:

2 at 240 cfs each

1 at 328 cfs

1 at 400 cfs

2 at 460 cfs each

1 at 656 cfs

1 at 787 cfs

Pumping stations are located at the various canals that cross the alignment, such as the Hope, Mississippi Bayou, Reserve Relief, Ridgefield, Vicknair and Montz Canals. It is generally expected that the gates would be closed, and the pumps would be operated during tropical/hurricane storm surge events. Pumping would continue until the water level returns to existing natural water level conditions (currently estimated to be El. 2.0 NGVD), at which time the operation of the pumps would be discontinued and the gates would be opened.

Pipeline Relocations

There are numerous pipeline relocations involved in this alignment. The diameters of the various pipelines are as follows:

6 in. and less	18 pipelines
12 in. and less (but greater than 6 in.)	40 pipelines
24 in. and less (but greater than 18 in.)	11 pipelines
Greater than 24 in.	1 pipeline

Alternative D

Alternative D starts at the Upper Guide Levee of the Bonnet Carre Spillway in St. Charles Parish, LA (north of the transmission and pipeline corridors), extends west around the I-10/I-55 interstate interchange, continues west along I-10 and ends at the Marvin Braud Pumping Station, in the vicinity of Sorrento (within the McElroy Swamp) in Ascension Parish, LA, a distance of 28.28 miles. The following information is based on modeling for a 100-year level of risk reduction in the Baseline Year of 2020 for a period of evaluation of 50 years and is subject to change based on further evaluation in future phases of the project. The top of levee elevation (net elevation) for this alignment ranges from El. 13.5 NAVD88 on the eastern reaches of the levee near the Bonnet Carre Spillway and gradually tapering to El. 8.0 NAVD88 as the levee moves west across the project area.

Floodwalls

Six Floodwalls (T-type walls), comprising a total of 4,011 linear feet, range from 15 ft. to 19 ft. in height; the top of wall design elevation is El. 17.0 NAVD88. The floodwalls, for the most part, are located where the alignment runs under I-10 and the I-10/I-55 interchange.

Floodgates

Three Floodgates, comprising a total of 306 linear feet, range from 15 ft. to 19 ft. in height; the top of gate design elevation is El. 17.0 NAVD88. The floodgates, for the most part, are located along the alignment, usually where canals and roads are.

Drainage Structures

Gravity Drainage Structures (with sluice gates), comprising a total of 396 linear feet, range from 20 ft. to 29 ft. in width. These are located near proposed pumping stations. For the Bayou Conway area, the required channel size is 24 ft. wide x 12 ft. deep (to convey 1,100 cfs of flow). For the Blind River area, the required channel size is 40 ft. wide x 20 ft. deep (to convey 4,500 cfs of flow).

Pumping Stations

There are 6 pumping stations located along the alignment. The different sizes (which assume there is no storage capacity available) are as follows:

1 at 200 cfs

1 at 400 cfs

1 at 450 cfs

2 at 1,100 cfs each (this includes the Bayou Conway area)

1 at 4,500 cfs (this is for the Blind River area)

Pumping stations are located at the various canals that cross the alignment, such as the Montz, Reserve Relief and Ridgefield Canals, as well as a local canal near approx. Baseline Station 951+00 and the Bayou Conway and Blind River areas. It is generally expected that the gates would be closed, and the pumps would be operated during tropical/hurricane storm surge events. Pumping would continue until the water level returns to existing natural water level conditions (currently estimated to be El. 2.0), at which time the operation of the pumps would be discontinued and the gates would be opened.

Pipeline Relocations

There are numerous pipeline relocations involved in this alignment. The diameters of the various pipelines are as follows:

6 in. and less	7 pipelines
12 in. and less (but greater than 6 in.)	6 pipelines
24 in. and less (but greater than 18 in.)	1 pipeline

There are at least two instances where the pipeline would cross through the floodwall (at approx. Baseline Station 1382+00 and at approx. Baseline Station 1404+00).

Culverts

There are 6 culverts (in addition to the culverts that exist under I-10) that facilitate tidal exchange of water with the wetlands.

Hydraulics and Hydrology

Interior Drainage

The interior drainage analysis for the feasibility study was broken down into two stages:

1) Determine the rough-order-of-magnitude (ROM) capacities of gravity drainage structures and pumps recommended to prevent project induced flooding for each of the proposed alignments (A, C and D).

2) For the tentatively selected plan (TSP), determine the capacities of gravity drainage structures and pumps using a detailed rainfall-runoff analysis.

For the ROM phase of the analysis, pump and gravity drainage recommendations were determined using an XP-SWMM model completed during the reconnaissance phase of the study for Alignments A and C. Figure 24 depicts the storage basin layout for used in the model. These basins correspond to the sizes and capacities listed in Table 10. Alignment D covers the area of Alignment C in addition to the drainage basins of the Blind River and Bayou Conway. Structures and pumps were sized for Blind and Conway using the HEC-HMS and HEC-RAS modeling suite. The recommendations are also listed in Table 10. All design values are based on a 10-yr, 24-hr rainfall.

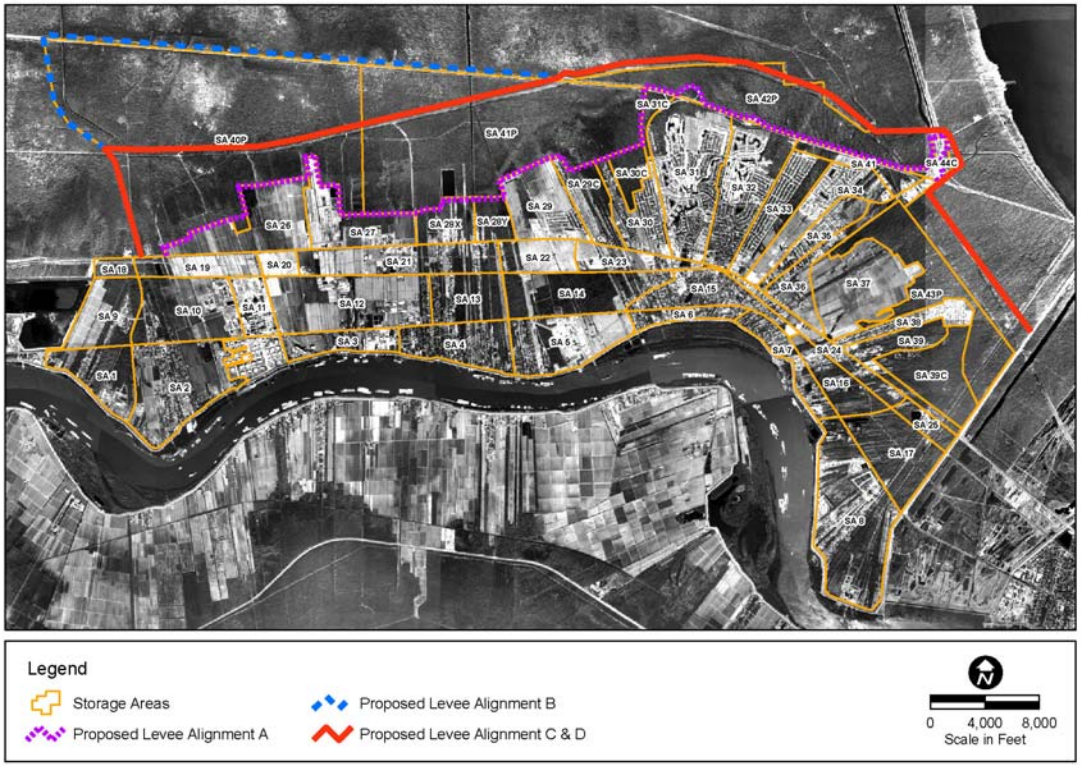


Figure 24: Storage Basin Layout

Table 10: ROM Determinations

Item / Location:	Alignment A	Alignment C and D	Blind River and Bayou Conway (Alignment D only)
Gravity Drain, SA-40P	1 RCBC*, 6' High by 20' Wide	1 RCBC, 6' High by 20' Wide	
Gravity Drain, SA-41P	2 RCBC's, 6' High by 20' Wide	2 RCBC's, 6' High by 20' Wide	
Gravity Drain, SA-42P	2 RCBC's, 6' High by 18' Wide	2 RCBC's, 6' High by 18' Wide	
Gravity Drain, SA-43P	2 RCBC's, 6' High by 18' Wide	2 RCBC's, 6' High by 18' Wide	
Pump Station, SA-40P	480 cfs	450 cfs	
Pump Station, SA-41P	1180 cfs	400 cfs	
Pump Station, SA-42P	920 cfs	200 cfs	
Pump Station, SA-43P	985 cfs	1100 cfs	
Gravity Drain, Blind River			40ft. wide, 20ft. deep rectangular cross section

Gravity Drain, Bayou Conway			24ft. wide, 12 ft. deep rectangular cross section is required
Pump Station, Blind River			1100 cfs
Pump Station, Bayou Conway			4500 cfs

*RCBC - Reinforced Concrete Box Culvert

Tropical/Hurricane Storm Surge Modeling

State-of-the-Art coastal ocean hydrodynamic analysis methods were used to determine the storm surge and wave results. The modeling system for this study was established by fine-tuning existing models used previously for the Joint Storm Surge (JSS) Analysis in Southern Louisiana for the Louisiana Coastal Protection and Restoration (LACPR) project, as well as the recent flood insurance rate map modernization study conducted by the Federal Emergency Management Agency (FEMA) (USACE 2008a; USACE 2007).

The data gathered from Advanced Circulation (ADCIRC) and the Steady State Spectral Wave (STWAVE) modeling were used to generate surge and wave return values ranging from the 50 year return to the 2000 year return in 50 year increments. A set of 152 hurricane condition storm events were used to develop an existing (2011) condition and future conditions for a 2020 intermediate relative sea level rise (SLR) and 2070 low, intermediate, and high SLR as well as alternative alignments intermediate SLR. The Joint Probability Method, with Optimum Sampling (JPM-OS) was applied for each data set to develop stage frequencies. The resulting levee design heights for the screening level effort for each alignment and for each condition (2011, 2020 and 2070) are shown on the following maps (Figures 25 through 33). It should be noted that, for Figures 28 through 33, the notation of "Considering Intermediate Sea Level Rise" on each of these maps refers to Intermediate Relative Sea Level Rise.

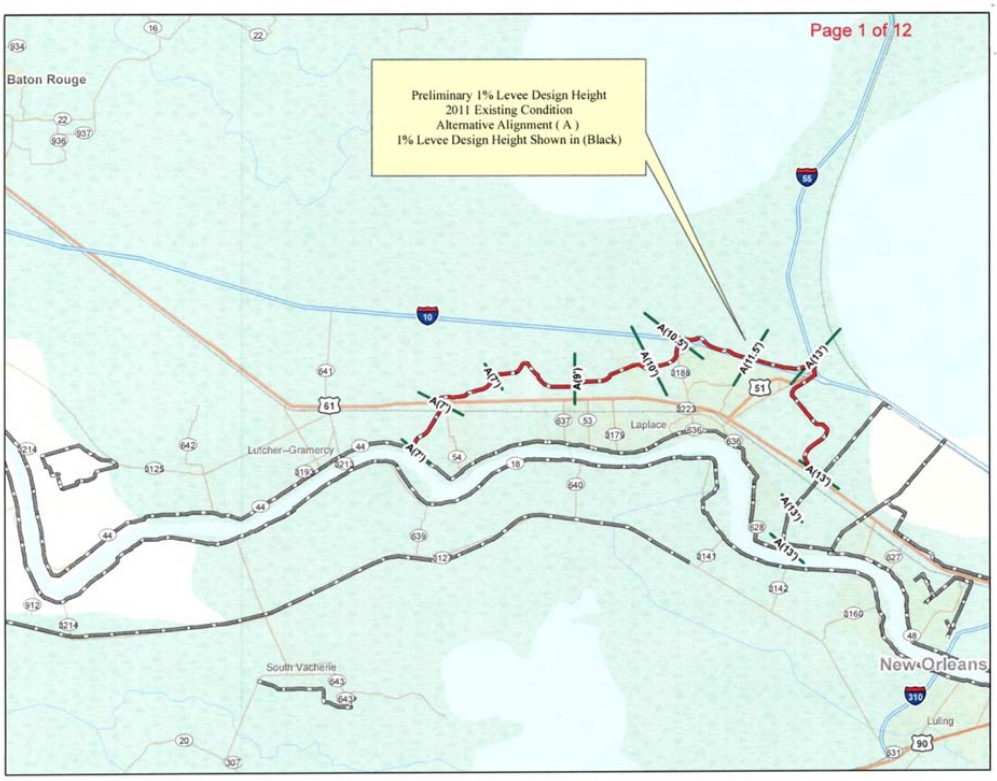


Figure 25: Levee Design Height Existing Conditions Alignment A

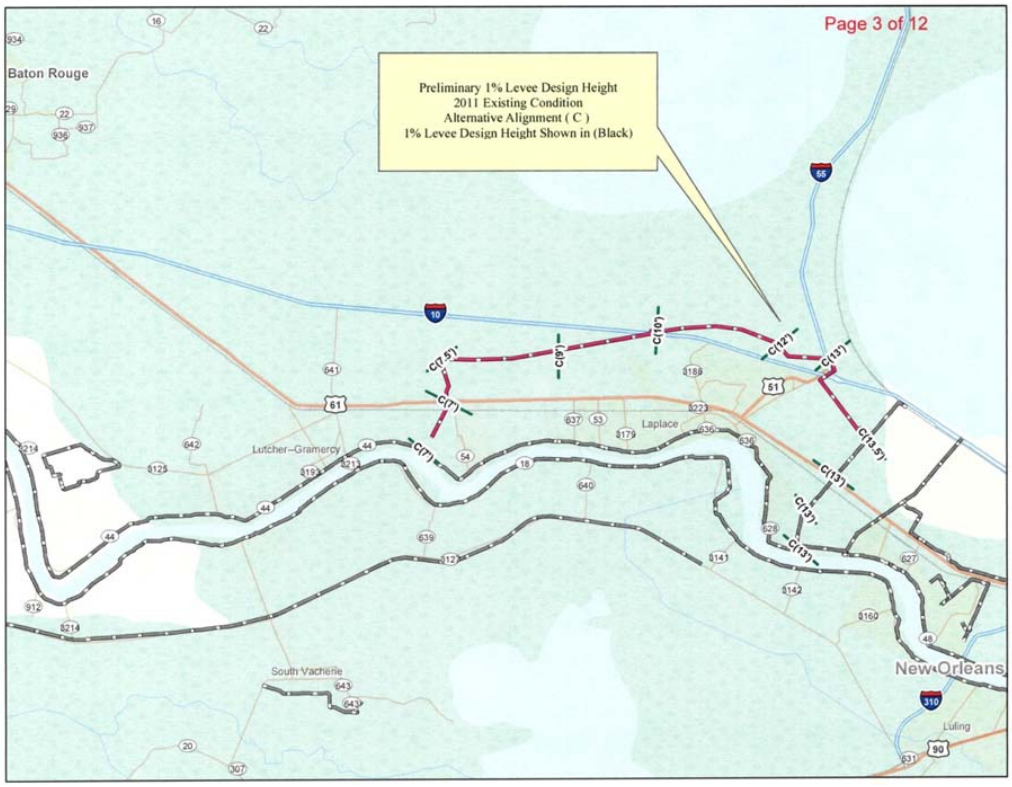


Figure 26: Levee Design Height Existing Conditions Alignment C

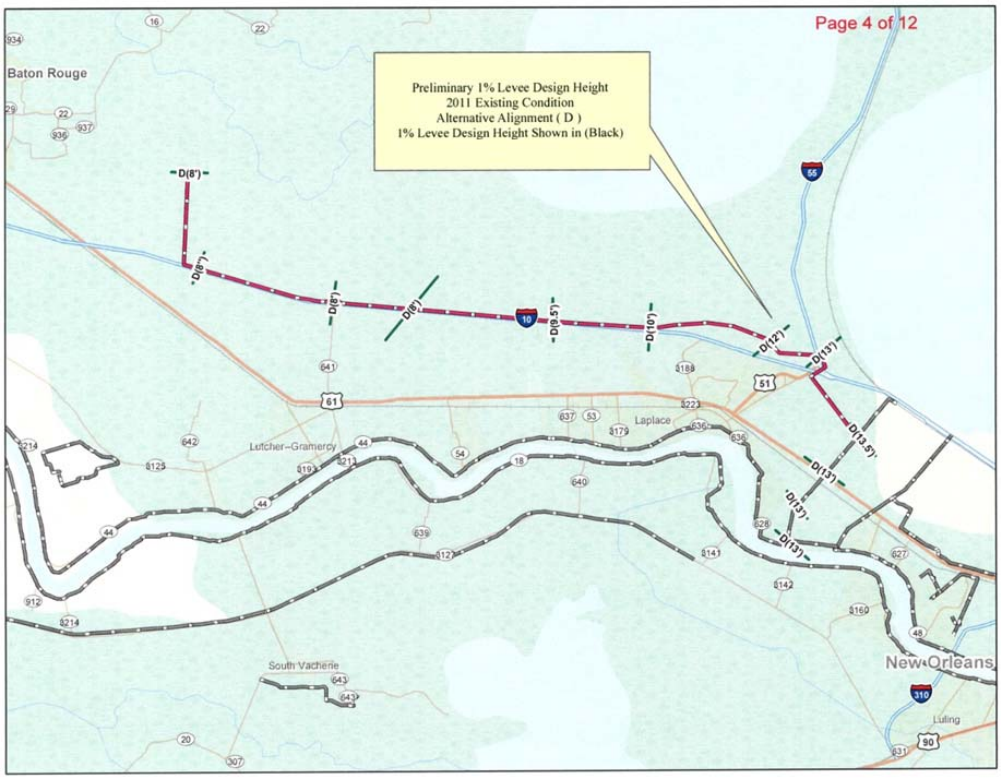


Figure 27: Levee Design Height Existing Conditions Alignment D

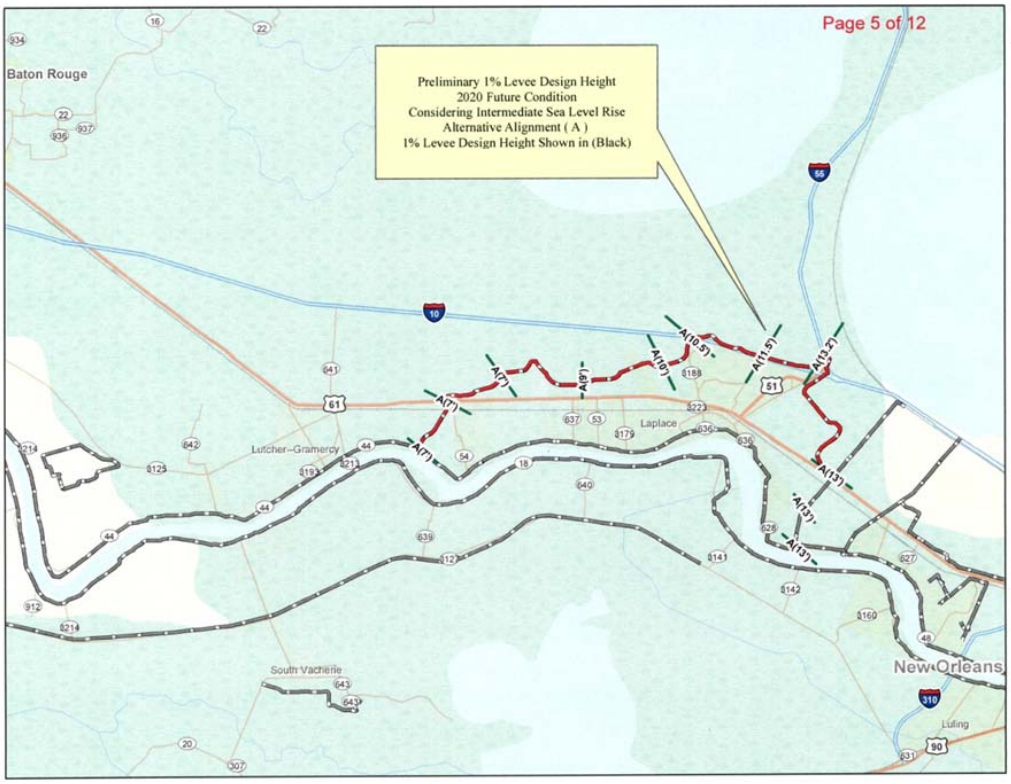


Figure 28: Levee Design Height 2020 Future Condition Alignment A

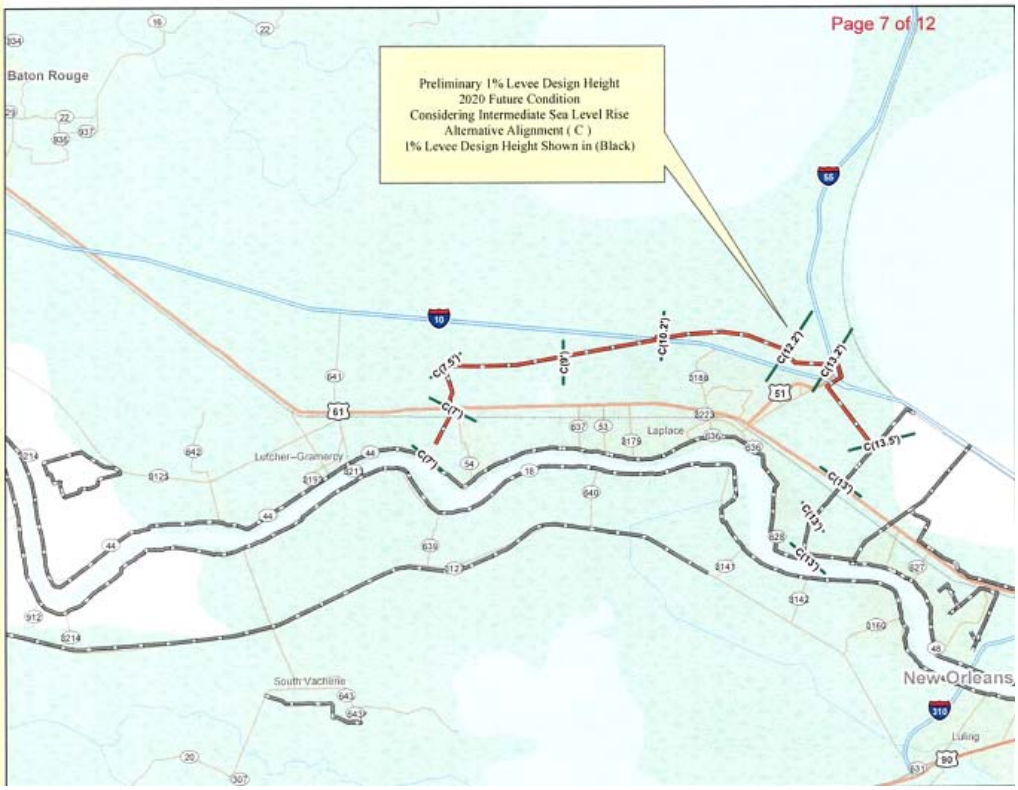


Figure 29: Levee Design Height 2020 Future Condition Alignment C

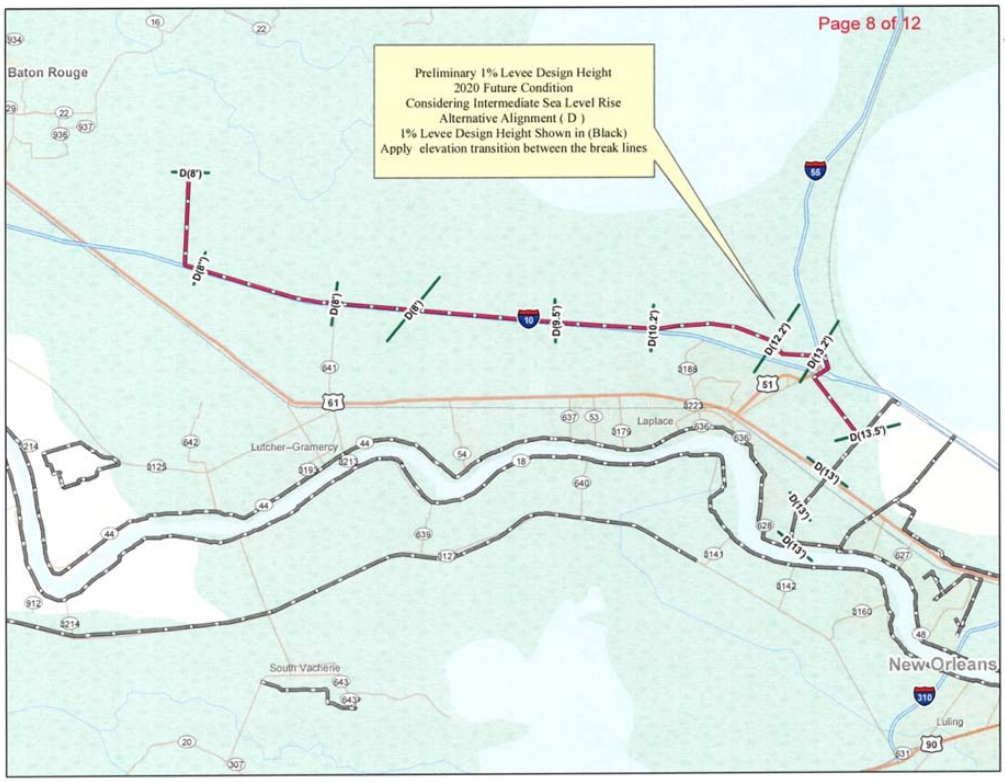


Figure 30: Levee Design Height 2020 Future Condition Alignment D

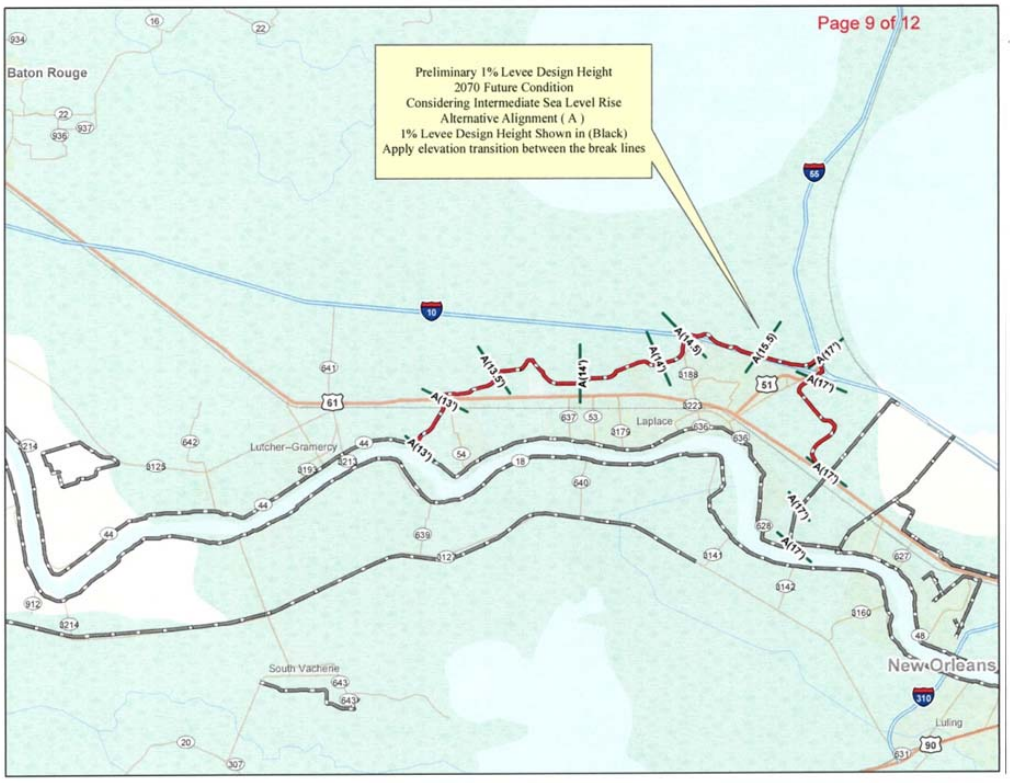


Figure 31: Levee Design Height 2070 Future Condition Alignment A

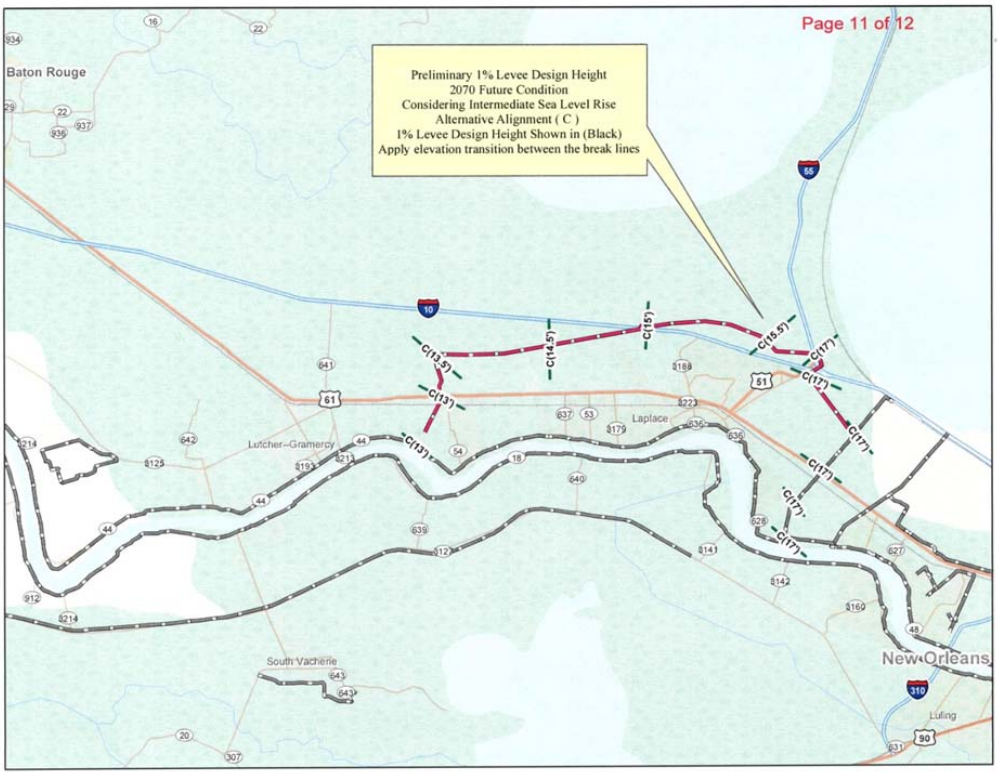


Figure 32: Levee Design Height 2070 Future Condition Alignment C

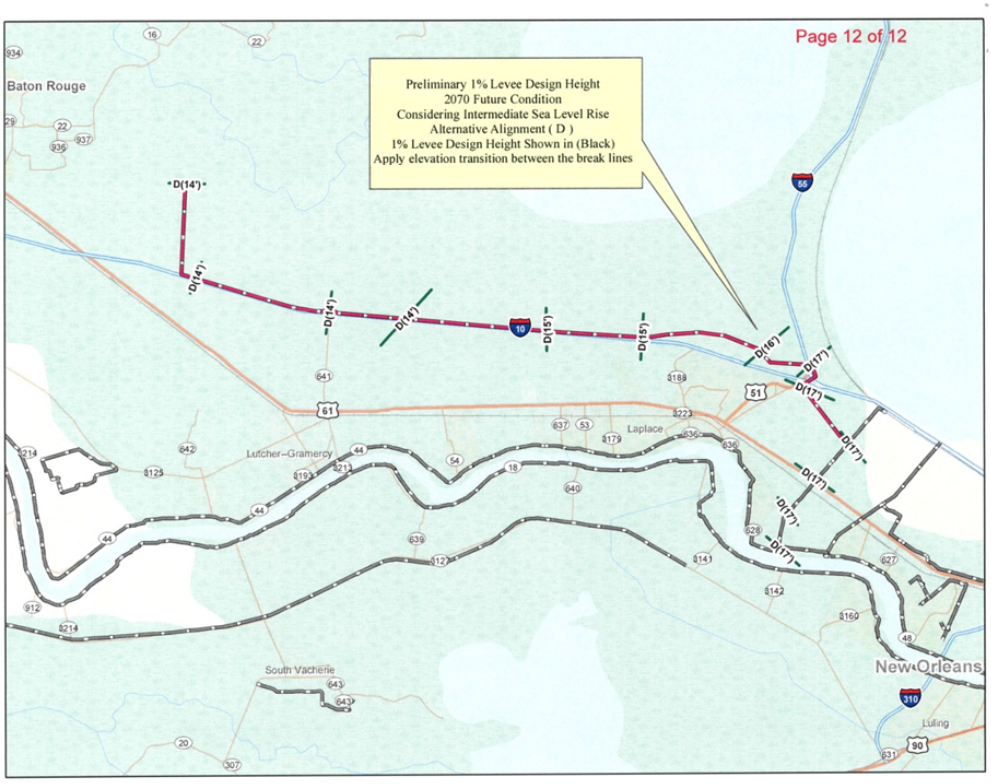


Figure 33: Levee Design Height 2070 Future Condition Alignment D

Potential Sea Level conditions are represented in the modeling system by application of a relative Sea Level Rise (SLR) that is consistent with USACE ER 1100-2-8162 (31 December 2013). Subsidence levels predicted in the study area were incorporated in the ADCIRC initial water level parameter to capture the combined effects of subsidence and local SLR into a single SLR value. For the Year 2020 and Year 2070 simulations, unique SLR values were added to the 2011 initial water surface elevations (WSE) to determine the initial WSE appropriate for each year and SLR rate. In addition to accounting for SLR of future conditions, the Year 2070 scenarios accounted for potential degradation of vegetation in landscapes. SLR changes (as well as salinity intrusion) can cause an associated vegetation degradation and / or loss (this was considered in the ADCIRC modeling). Since these are slow-moving processes, forecasts of 50 years in the future were used, with intermediate SLR conditions. See Figure 34 for SLR estimates for Years 2011 through 2080.

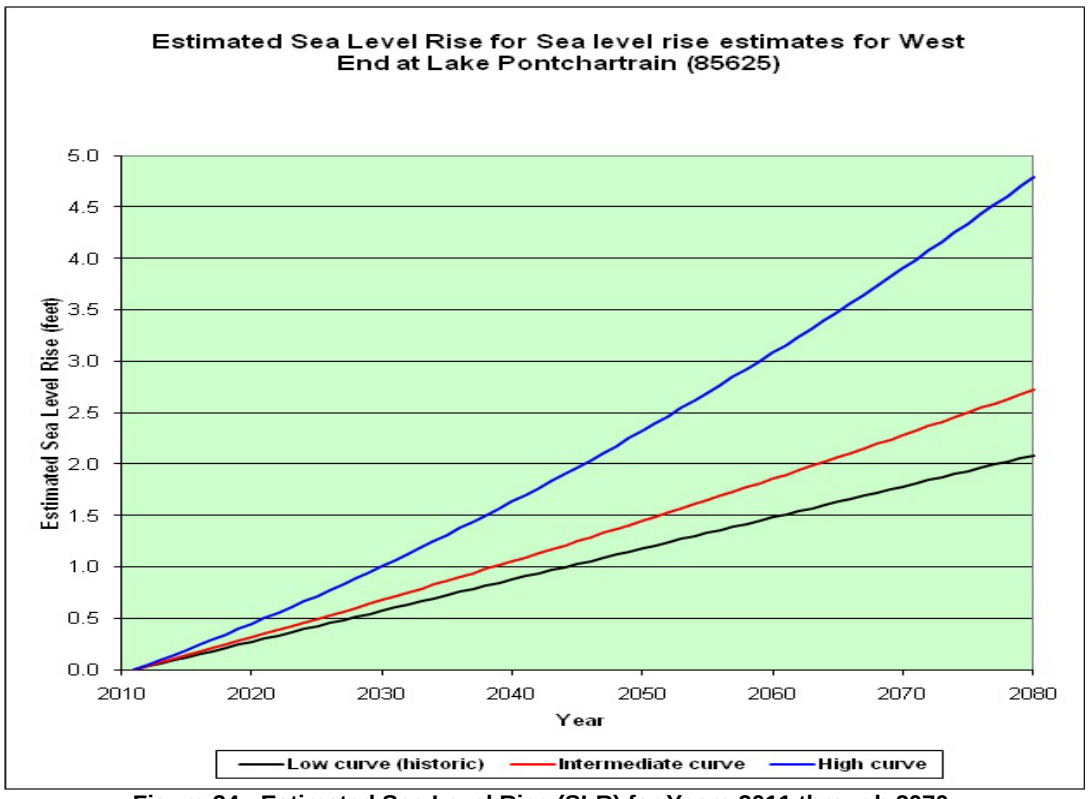


Figure 34: Estimated Sea Level Rise (SLR) for Years 2011 through 2070

Water Quality

This water resource is significant because of the Clean Water Act, as amended, the Pollution Prevention Act, the Safe Drinking Water Act, and the Water Resources Planning Act, regulations which provide for the protection of U.S. waters for the purposes of drinking, recreation, and wildlife. It also provides for the purposes of restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters. Study area water quality is influenced by basin elevations, surface water budget, land cover and use, coastal and geological processes, and regional weather. The study area is in the southwestern portion of a basin consisting of uplands to the north and estuary to the south, with increasing estuary salinity eastward. The estuary has experienced hydromodification via the construction of canals and embankments. Historical study area water quality is depicted in several references which include the review of data from basin tributaries and estuary lakes and passes. Garrison (1999) provides a statistical summary of general parameters, major ions, nutrients, trace metals, and organic compounds for water quality data collected in Lake Maurepas between 1943 and 1995. Overall, the summary suggests the lake is freshwater, oligotrophic, and does not contain elevated contaminant levels. To determine the most prevalent water quality issues present in the study area, historical Section 305(b) lists were reviewed to determine the most significant causes and sources of subsegment impairment. The most current (2012) 303(d) list for the study area is depicted in Table 11. Ordered by decreasing frequency cited, suspected causes of impairment include non-native aquatic plants, low dissolved oxygen, mercury, elevated turbidity, and fecal coliform, while suspected sources of impairment include wetland habitat modification, introduction of non-native organisms, atmospheric deposition, unknown sources, on-site treatment systems, natural sources, and agriculture.

Table 11: Study Area 2013 303(d) List

Subsegment	Impaired Use for Suspected Cause	Suspected Cause of Impairment	Suspected Source of Impairment	IR Category	TMDL Priority
040401	FWP	Dissolved Oxygen	Wetland Habitat Modification	IRC 5	L
		Mercury	Atmospheric Deposition	IRC 4a	
			Source Unknown	IRC 4a	
		Non-Native Aquatic Plants	Introduction of Non-native Organisms	IRC 4b	
		Turbidity	Wetland Habitat Modification	IRC 4a	
	ONR	Turbidity	Wetland Habitat Modification	IRC 4a	
	PCR	Water Temperature	Natural Sources	IRC 5	L
			Wetland Habitat Modification	IRC 5	L
040403	FWP	Dissolved Oxygen	Agriculture	IRC 5	L
			Wetland Habitat Modification	IRC 5	L
		Mercury	Atmospheric Deposition	IRC 4a	
				IRC 5	L
			Source Unknown	IRC 4a	
				IRC 5	L
		Non-Native Aquatic Plants	Introduction of Non-native Organisms	IRC 4b	
040404	FWP	Dissolved Oxygen	On-site Treatment Systems	IRC 5	L
		Non-Native Aquatic Plants	Introduction of Non-native Organisms	IRC 4b	
	PCR	Fecal Coliform	On-site Treatment Systems	IRC 5	H
040602	FWP	Non-Native Aquatic Plants	Introduction of Non-native Organisms	IRC 4b	

Both historical 305(b) and current 303(d) lists suggest primary study area water quality problems relate to hypoxia. As a further to this suggestion, in 2011 a TMDL report was prepared for the lower Amite River watershed (located just north of subsegments partially included in the study area) to address organic enrichment and low dissolved oxygen. Long-term water quality monitoring in the study area was conducted by the Louisiana Department of Environmental Quality (LDEQ). Water quality trends in the study area based on this water quality assessment would be expected to continue. In particular, low dissolved oxygen conditions in the Maurepas Swamps and increasing marine influence in the northern study area are expected to persist, while the historically most common suspected causes of impairment within the study area would continue to generate water quality problems in competition with management efforts to eliminate impairments. With project water quality is addressed in the EIS.

Climatology

Temperature

Records of temperature are available from "Climatological Data" for Louisiana, published by the National Climatic Data Center. The study areas can be described by using the normal temperature data observed at the Hammond, and Donaldsonville stations. These stations are shown in Table one below with the monthly and annual mean normals which are based on the period of 1991-2011. The average annual mean normal temperature is 59.4^{o}F, with monthly mean temperature normal varying from 81.9^{o}F in July to 48.7^{o}F in December.

Precipitation

Records of precipitation are available from “Climatological Data” for Louisiana, published by the National Climatic Data Center. Two stations in the Louisiana study have been used to show the rainfall data for the areas of Donaldsonville and Ponchatoula/Hammond. Both stations have normal precipitation records which are based on the period of 1991-2011. The average annual normal rainfall of the two stations is 58.14 inches. The wettest normal month is June with a monthly average of 6.48 inches. October is the driest normal month averaging 4.11 inches and Donaldsonville has the greatest day with 24.49 inches of rain falling in June 2001.

Geotechnical

Engineering included the preparation of earthwork stability templates, settlement and lift schedule predictions, preparation of schematic alignment layouts, schematic pump station layouts, and scoping level project cost estimates for the elimination of alternatives to determine a tentatively selected plan. Schematic earthwork templates and settlement and lift schedule predictions were also performed.

The process to complete the scoping level engineering started with the geotechnical evaluation of the different alignments. The geotechnical evaluation consisted of reviewing existing soil boring data, preparation of earthwork stability templates, T-Wall analysis, settlement predictions, additional lifts, and secondary settlement predictions.

Geotechnical data was used to develop soil design parameters for the proposed alignments. At the time of the geotechnical report, four alternative alignments (reduced to three in August 2012) were being considered for the project. These alignments are denoted as Alignments A, C and D. Eighty three borings have been utilized for this screening study, with 23 geologic reaches and eleven soil reaches being developed. The alignments and reaches, as well as the developed soil design parameters, are shown in tabular and graphical form in the Draft Geotechnical Report Appendix I from March 2012.

Of the 83 borings furnished, 32 borings are located on Alignment A from its western limit at Hope Canal to its intersection with I-10 west of Highway 3188. These 32 borings comprise Soil Reaches 1 through 5. An additional 17 borings are located on the portion of Alignment A which coincides with I-10 from Highway 3188 to just west of the intersection with I-55 and comprise Soil Reaches 6 and 7. Thus, over half of the available data and selected reaches coincide with Alignment A.

The proposed alignments from the I-55 interchange to the St. Charles Parish line vary among the furnished drawings. For the purposes of this study, Alignment A is referenced as Alignment A in the geologic descriptions and reaches. Alignments C and D should be considered to coincide with Reach A in this area. Soil Reaches 8 through 10 were developed from the 27 borings in this area. However, as noted, these borings may not coincide with any or all of the current alignments.

Two of the available borings were utilized to define Soil Reach 11 at Mississippi Bayou. The remaining three borings were included with Soil Reach 1, but these borings coincide with Alignment C along the western side of the project.

Geotechnical data is not available for the portions of Alignments C and D which did not coincide with Alignment A at the time of this study. It has been projected that anticipated geologies at these locations are based on available data and information.

It should be noted that the geotechnical investigation was limited for this preliminary screening phase and did not include any exploration.

Methodology and Assumptions. The analyses consider the HSDRRS design guidelines dated 23 October 2007, with the geotechnical section as updated on 12 June 2008, although the scope does not include all cases required by this guideline. Required factors of safety and design cases are based on these guidelines. The HSDRRS design guidelines have been updated since issuance of the draft report. The scope of this study only includes an evaluation of Q-case parameters assuming eventual use of S-case parameters will be less restrictive.

Water Levels. Hydraulic design criteria were selected based on GFI in the form of preliminary hydrographic survey maps. The levees were evaluated using the water levels furnished for the

future conditions anticipated for the year 2020. To include structural superiority, the floodwall analyses are based on water levels projected for the year 2070.

The scope of this alternative alignment screening level study included stability analyses by Spencer's Method for water at the project grade level (PGL), still water level (SWL) and low water level (LWL) at the levees. The scope did not include consideration of the Top of Levee (TOL), as this was not considered a critical design case for this alternative alignment screening level study. The scope for this study also did not include an evaluation of stability by the Method of Planes (MOP) analyses. Stability analyses for the structures only considered extreme water level (EWL) and SWL.

Stability Analyses. Stability of earthen levees for the 11 soil design reaches were evaluated. Five of these reaches were also evaluated with geotextile reinforcement to reduce the size of the berms. Nine structures (T-walls and gates) were also evaluated.

Levee Stability. The earthen levees generally consist of a 10-ft levee crown with 3 horizontal on 1 vertical (3H:1V) side slopes. Substantial stability berms on the flood side and protected side are required for Soil Reaches 6 through 10. For these reaches, the berms can be reduced with the addition of geotextile reinforcement. A tabular summary of the results along with a plate of the governing stability analysis results are provided in the Draft Geotechnical Report Appendix I from March 2012 (which is available upon request).

Structure Stability. The T-walls and gates are located within Soil Design Reaches 1, 8 and 11. The majority of the cases analyzed indicate the presence of an unbalanced load. A tabular summary of all the results along with a plate of the governing analyses are included in the Final Geotechnical Report Appendix I from February 2014 (which is available upon request). In addition to stability analyses, estimates of allowable pile load capacity were also computed for each soil reach where structures will be located.

Underseepage Analysis for Levees. With large stability berms required for several levees and considering a predominantly clay foundation, levee underseepage potential is not a significant design concern for most of the design soil reaches. However, Soil Reach 11 identified channel fill that will require either a cutoff, relief wells or seepage berms. Detailed underseepage analyses will be required during final design of theRecommended Plan to meet the HSDRRS design guidelines. The final field investigation should consider the estimated locations of abandoned distributaries and channel fill. Additional measures may be required to ensure adequate factors of safety are maintained.

Underseepage Analysis for Structures. Underseepage of pile-supported T-walls was evaluated using the Lane's Weighted Creep Ratio (LWCR) method to establish the tip elevations for the sheet pile cutoff wall. The flow path was assumed only to be the penetration of the sheet pile and horizontal contacts were not assumed. The sheet pile tip embedments are governed by seepage instead of the HSDRRS requirement of 5 feet of penetration below the critical failure plane (for unbalanced load cases).

Settlement Analyses. Settlement analyses were performed for Soil Reaches 1, 4, 6 and 10. An evaluation of the time-rate of consolidation settlement was not conducted; however, estimates for lift construction are available.

In general, settlement parameters for all reaches considered the surficial natural levee deposits and underlying Pleistocene deposits as precompressed. In addition, based on the available data, the swamp deposits were modeled to have an over consolidation ratio (OCR) between 3 and 10 in Soil Reaches 1 and 4 and between 1 and 2 in Soil Reaches 6 and 10. The interdistributary clays were typically modeled as normally consolidated. These values were based on the available boring data and correlations of moisture content to compression ratio

(CR) values developed in the region. The parameters generally only consider the stress history at the available boring locations. The stress history at alignments away from the boring data was not assumed.

The higher OCR values in the swamp deposits may only be applicable to previously developed areas in Alignment A. Thus, even in Soil Reach 1, additional lifts may be needed to maintain the levee height in previously undeveloped areas along Hope Canal and along Alignment C. Due to the shallow depth of the Pleistocene interface on the western side of the project, additional fill height would be anticipated to be low. However, moving eastward along the project as the Pleistocene interface increases in depth, the potential for lift construction would increase. Further, it appears current alignments diverge from developed areas east of the I-10/I-55 interchange, increasing this potential even further.

Based on the parameters developed for Soil Reaches 1 and 4, a minimum of 1.5-ft overbuild was assumed in all of the levee stability analyses. The overbuild height for Soil Reach 1 did not require consideration of submergence. Submergence was considered for Soil Reach 4. Settlements greater than 1.5 feet were computed for Soil Reaches 6 and 10 where larger berms and/or greater fill heights would be required. Thus, lift construction will be required for these reaches to maintain the design grade.

The greatest levee height and greatest settlement were computed for Soil Reach 10. This soil reach also has the deepest Pleistocene interface. For Soil Reach 10, an overbuild height of 2.6 feet was computed. It was estimated an additional 3 inches of settlement would occur for this overbuild once the initial levee is fully consolidated. This resulted in a total overbuild of approximately 3 feet. It was determined that only one additional lift thickness be assumed and this lift may be considered as 1.5 feet with an initial overbuild of 1.5 feet. It was also decided that this lift schedule be assumed for Soil Reaches 8, 9 and 10. Based on calculations for Soil Reach 6, it was estimated the overbuild would need to be increased from 1.5 feet to 2.5 feet. Thus, a 1-ft lift thickness beyond the initial 1.5-ft overbuild should be assumed. This lift thickness was applied to Soil Reaches 6 and 7. No lift schedule is deemed necessary for Soil Reaches 1 through 4 and 11 on Alignment A.

The furnished hydraulic data is based on a design year of 2020. The design levee heights were considered to occur from 2012 to 2020. This is a relatively short design period. Therefore, only one construction lift was assumed to be feasible. It was determined that this lift be estimated to occur halfway through the design period or four years into the eight-year design. Given the limited data for this screening study, only assumed time-rate of settlement parameters could be developed. However, even these assumptions would not address the stress history and time-rate away from the boring locations. For alignments within previously undeveloped areas, an additional lift or increased lift thickness may be required.

Datum and Topography

The furnished soil borings and the soil parameter plots are referenced to NGVD. These elevations were reduced by 1 foot for conversion to the NAVD88 datum. Water levels were provided in NAVD88. All the analyses for this feasibility report reflect the NAVD88 datum. Topographic survey data was not obtained for the alternative alignments. Review of available Lidar data indicated average grade at Elevation 1.0 NAVD88 should be used for the analyses of the levees. While the ground elevation varies along the length of each alignment, the assumed ground elevation of 1.0 NAVD88 was appropriate for the majority of the alignment and conservative for the areas of higher ground elevation. With the exception of furnished gate elevations, average grade at Elevation 1.0 was also used for the typical T-wall analyses.

Civil/Structural Design

Three alternatives were evaluated for scoping level engineering: Alignment A, Alignment C and Alignment D. Prior to the scoping level engineering, the alignments consisted of non-dimensional generalized locations on large scale mapping. The purpose of the scoping level engineering was to refine the generalized alignment locations into levee cross sections coordinated with existing topography features (streams, channels, wetlands, etc.) and existing infrastructure (highways, pipelines, utilities, etc.).

After the levee templates were completed, it was decided to apply the design templates to Alignments A, C and D.

A set of standard details was prepared to provide a schematic elevation view of the typical pump station T-Wall, Interstate T-Wall, Roadway/Railroad Floodgate T-Wall and Pipeline T-Wall. These typical elevations included clearance recommendations from the geotechnical engineers to ensure the new construction would not adversely impact existing infrastructure. Drawings showing the typical elevations are available upon request.

The pump station flow rates and gravity drainage gate sizes were computed. These pump station flow rates and gravity drainage gate sizes were based upon hydrologic units defined in the existing SWMM model. If multiple drainage outfalls existed in the hydrologic unit, the projected pump station flows and gravity drainage gate sizes were divided based upon the percentage of the outfall's contributory area in the delineated hydrologic unit. The pump stations were grouped into twelve types based upon the pump and gate sizes. Typical Floor Plans were developed for each pump station type. These typical floor plans and a typical elevation through the station are available upon request.

A "smoothed" version of **Alignment A** was used in order to minimize the encapsulation of wetlands in the protection system. Alignment A begins at the Upper Guide Levee of the Bonnet Carre' Spillway and travels westerly parallel to an existing pipeline corridor, around the Interstate 10/Interstate 55/US Highway 51 interchange, then follows Interstate 10 to the LA 3188 (Belle Terre Boulevard) interchange, then southerly and westerly paralleling the wetland wet/dry line to Mt. Airy where it terminates at the Mississippi River levee. The "smoothed" alignment was placed on the DOQQ base map and adjusted in a few minor locations. These locations included the Interstate 10 crossing east of the LaPlace interchange, the Interstate 55 crossing north of the US Highway 51 entrance ramp, the Interstate 10 crossing west of the Belle Terre interchange, and the existing water tower adjacent to the Belle Terre interchange. The modifications at the Interstate crossings were performed to cross the elevated structures with a ninety degree crossing that will ultimately be passed between existing bridge bents with a T-Wall. The Interstate 55 crossing was moved north to include the entrance/exit ramps from US Highway 55 and provide access for evacuation and recovery.

The top of levee elevation (net elevation) for this alignment is El. 13.5 NAVD88 (based on providing 100-Year protection in the Baseline Year of 2020), then decreases to El. 13.2 NAVD88 (at approx. Baseline Station 421+00), then decreases to El. 11.5 NAVD88 (at approx. Baseline Station 552+00), then decreases to El. 10.5 NAVD88 (at approx. Baseline Station 614+00), then decreases to El. 10.0 NAVD88 (at approx. Baseline Station 700+00), then decreases to El. 9.0 NAVD88 (at approx. Baseline Station 821+00) and finally decreases to El. 7.0 NAVD88 (at approx. Baseline Station 1013+00). The levee design, which involves the placement (in 2 lifts, 5 years apart) of approx. 3.1 million cubic yards of compacted and uncompacted clay fill, on top of 3.7 million square yards of geotextile fabric (with a 70-ft. width) along with a 100-ft. base width, 3:1 side slopes and 10-ft. crown width, creates a footprint of 411

acres. An aggregate limestone road (6 ft. wide x 8 in. thick) sits on top of the levee crown, a total of 29,615 cubic yards.

The design levee templates were placed along the proposed Alignment A at the defined soil and hydraulic reaches and based upon the recommended offsets for future maintenance activities, impacts to existing pile supported structures, offsets for stability from potential excavations (pipeline rights-of-way) and existing drainage features. Special attention was made to locate the right-of-way limits for the proposed levee sections to coincide with the existing rights-of-way from highways, pipelines etc. to avoid remainder parcels that were nonfunctional to the original owner. After the earthen embankments were placed on the base map and transitions performed from template section to template section, Alignment A was evaluated for specialty locations such as pump stations, T-Walls, gates, ramps, and pipeline crossings. The typical elevation details described above were utilized at appropriate locations and widths adjusted based upon the pump station size, Interstate crossing width, roadway/railway width, number of pipelines, etc. Alignment A was approximately 107,800 feet (20.41 miles) long and included 4,774 feet of T-Wall, 240 feet of drainage gates, 1,218 feet of roadway gates, two railway gates, seventy pipeline crossings, and eight pump stations. Schematic plans and typical levee sections (first and second lifts) were developed for Alignment A with levee template section, pump station, gate, T-Wall and pipeline crossings annotated. These schematic plans and typical levee sections are available upon request.

Alignment C begins at the Upper Guide Levee of the Bonnet Carre' Spillway and travels westerly parallel to an existing pipeline corridor, around the Interstate 10/Interstate 55/US Highway 51 interchange, then follows the existing pipeline corridor to Interstate 10/LA 3188 (Belle Terre Boulevard) interchange, then southerly and westerly paralleling the existing pipeline corridor to Mt. Airy where it terminates at the Mississippi River levee. Alignment C was developed to minimize the number of pipeline crossings.

The top of levee elevation (net elevation) for this alignment is El. 13.5 NAVD88 (based on providing 100-Year protection in the Baseline Year of 2020), then decreases to El. 13.2 NAVD88 (at approx. Baseline Station 304+00), then decreases to El. 12.2 NAVD88 (at approx. Baseline Station 354+00), then decreases to El. 10.2 NAVD88 (at approx. Baseline Station 612+00), then decreases to El. 9.0 NAVD88 (at approx. Baseline Station 722+00), then decreases to El. 7.5 NAVD88 (at approx. Baseline Station 905+00) and finally decreases to El. 7.0 NAVD88 (at approx. Baseline Station 968+00). The levee design, which involves the placement (in 2 lifts, 5 years apart) of approx. 3.1 million cubic yards of compacted and uncompacted clay fill, on top of 3.4 million square yards of geotextile fabric (with a 70-ft. width) along with a 100-ft. base width, 3:1 side slopes and 10-ft. crown width, creates a footprint of 856 acres. An aggregate limestone road (6 ft. wide x 8 in. thick) sits on top of the levee crown, a total of 26,124 cubic yards. A conveyance canal is situated along the entire levee (with a bottom depth elevation of El.-10 ft. NAVD88).

The design levee templates were placed along the proposed Alignment C at the defined soil and hydraulic reaches and based upon the recommended offsets for future maintenance activities, impacts to existing pile supported structures, offsets for stability from potential excavations (pipeline rights-of-way) and existing drainage features similar to Alignment A. There was a section of Alignment C from the Interstate 10/LA 3188 (Belle Terre Boulevard) interchange to the Mt. Airy community where there were no soil boring data and design levee templates were not developed. The other alignment's design levee templates that were in the closest proximity of the required hydraulic reach defined were used. Special attention was made to locate the right-of-way limits for the proposed levee sections to coincide with the existing rights-of-way from highways, pipelines etc. to avoid remainder parcels that were nonfunctional to the original owner. Once all the required design levee templates were selected for the hydraulic reaches,

the levee sections were transitioned together similar to Alignment A. Alignment C was evaluated for specialty locations such as pump stations, T-Walls, gates, ramps and pipeline crossings.

Alignment C was approximately 96,500 feet (18.27 miles) long and included 5,304 feet of T-Wall, 2080 feet of drainage gates, 288 feet of roadway gates, two railway gates, thirty-six pipeline crossings, and four pump stations. Schematic plans and typical levee sections (first and second lifts) were developed for Alignment C with levee template section, pump station, gate, T-Wall and pipeline crossings annotated. These schematic plans and typical levee sections are available upon request.

Alignment D begins at the Upper Guide Levee of the Bonnet Carre' Spillway and travels westerly parallel to an existing pipeline corridor, around the Interstate 10/Interstate 55/US Highway 51 interchange, then follows the existing pipeline corridor to Interstate 10/LA 3188 (Belle Terre Boulevard) interchange, then westerly paralleling the Interstate 10 right-of-way approximately to the St James/Ascension Parish line, then turns northerly through the McElroy Swamp to the New River Canal, then westerly to the Marvin Braud Pump Station levee. Alignment D was developed to provide flood protection to the maximum number of communities in St Charles, St. John the Baptist, St. James, and Ascension Parishes and protect the Interstate 10 corridor. Alignment D also minimizes the number of pipeline crossings.

The top of levee elevation (net elevation) for this alignment is El. 13.5 NAVD88 (based on providing 100-Year protection in the Baseline Year of 2020), then decreases to El. 13.2 NAVD88 (at approx. Baseline Station 305+00), then decreases to El. 12.2 NAVD88 (at approx. Baseline Station 354+00), then decreases to El. 10.2 NAVD88 (at approx. Baseline Station 600+00), then decreases to El. 9.5 NAVD88 (at approx. Baseline Station 750+00) and finally decreases to El. 8.0 NAVD88 (at approx. Baseline Station 940+00). The levee design, which involves the placement (in 2 lifts, 5 years apart) of approx. 3.8 million cubic yards of compacted and uncompacted clay fill, on top of 3.1 million square yards of geotextile fabric (with a 70-ft. width) along with a 100-ft. base width, 3:1 side slopes and 10-ft. crown width, creates a footprint of 1,181 acres. An aggregate limestone road (6 ft. wide x 8 in. thick) sits on top of the levee crown, a total of 36,880 cubic yards. A conveyance canal is situated along the entire levee (with a bottom depth elevation of El.-10 ft. NAVD88).

The design levee templates were placed along the proposed Alignment D at the defined soil and hydraulic reaches and based upon the recommended offsets for future maintenance activities, impacts to existing pile supported structures, offsets for stability from potential excavations (pipeline rights-of-way) and existing drainage features similar to Alignments A and C. There was a section of Alignment D from the Interstate 10/Hope Canal crossing to the Marvin Braud levee where there were no soil boring data and design levee templates were not developed. The other alignment's design levee templates that were in the closest proximity of the required hydraulic reach defined were used. Special attention was made to locate the right-of-way limits for the proposed levee sections to coincide with the existing rights-of-way from highways, pipelines, etc. to avoid remainder parcels that were nonfunctional to the original owner. Once all of the required design levee templates were selected for the hydraulic reaches, the levee sections were transitioned together similar to Alignments A and C. Alignment D was evaluated for specialty locations such as pump stations, T-Walls, gates, ramps and pipeline crossings.

Alignment D was approximately 149,300 feet (28.28 miles) long and included 4,011 feet of T-Wall, 396 feet of drainage gates, 306 feet of roadway gates, no railway gates, fourteen pipeline crossings, and six pump stations. Schematic plans and typical levee sections (first and second lifts) were developed for Alignment D with levee template section, pump station, gate, T-Wall,

and pipeline crossings annotated. These schematic plans and typical levee sections are available upon request.

Quantities. Quantities were computed for clearing and grubbing, geotextile, earthwork, aggregate roadway, turf establishment, T-Walls, drainage gates, roadway gates, railroad gates, pump stations and pipeline relocations.

Clearing and grubbing was based upon the proposed levee right-of-way limits denoted on the typical levee sections for the length of the reach and converted to acres. Geotextile was based upon the proposed width denoted on the typical levee sections for the length of the reach and converted to square yards. Earthwork was computed by end area denoted on the typical levee sections for the length of the reach. To determine the end area for each typical levee section, the average groundline elevation along the alignment centerline was computed. LIDAR data from the Louisiana State University Atlas Database was loaded into ArcGIS and the EZProfiler extension was used to obtain x, y, z, coordinates in Louisiana State Plane Coordinate System. The EZProfiler parameters were set to obtain coordinates and elevations every 45 feet along the alignment since the LIDAR data had 15 feet by 15 feet pixels. The EZProfiler dumped the coordinate and elevation data into an Excel spread, where the groundline elevation was averaged. The average groundline elevation was included in the levee typical section and the end areas were computed for each individual reach. After the end areas were computed, the length of the earthen levee segments were multiplied by the end area and ten by a 1.25 consolidation factor before converting into cubic yards. The 1.25 consolidation factor was used to account for consolidation and compaction of underlying existing soils as the new earthwork lifts are performed. Turf establishment quantities were set equal to the clearing and grubbing limits and converted to acres. Aggregate road surfacing was computed from the levee segment length and a section 6 feet wide and 8 inch deep then converted to cubic yards. T-Walls, Drainage Gates, and Roadway Gates were tabulated by length and incremental wall heights. An incremental wall height of 5 feet was set as the criteria. Railroad gates were measured per each. Pipeline relocations were measured per each and the incremental pipeline size. Incremental pipeline sizes were set at less than or equal to 6 inches, greater than 6 inches up to 12 inches, greater than 12 inches up to 18 inches, greater than 18 inches up to 24 inches and greater than 24 inches. All quantities for Alignments A, C and D were computed in the same manner.

Relocations

An ArcGIS State of La. Oil Spill Response Database was used to identify the pipeline locations for each alignment. This database contained not only the shapefiles of the pipelines but in most instances the owner, size, type and the carried material. This data was used for each of the three alignments. The assumption for each alignment was that a pipeline floodwall would be required wherever a pipeline crossed the levee footprint. The pipeline would cross through the pipeline floodwall. It was decided that the existing carrier line would remain in operation while a bypass line would be constructed through a sleeve in the T-wall cutoff piles. When the bypass would be complete and in place, the switch over-tie in with the existing line then would follow. A unit cost for the different pipe size ranges was used (unit costs were furnished by USACE). See below.

Pipeline Relocations

Description	Estimated Quantity (Q)	Units	Unit Cost (UC)
≤6" Diameter	14	Each	$515,000
>6" to ≤12" Diameter	16	Each	$700,000
>18" to ≤24" Diameter	5	Each	$1,550,000
> 24" Diameter	1	Each	$1,920,000

Cost Estimates

After each alignment's quantities were finalized, cost estimates were prepared for each alignment. For each item, the item description, item quantity, unit of measure, unit cost, item cost, contingency and total item cost was tabulated in an Excel spreadsheet; the same information was later prepared in MII MCACES format. Since the unit of measure for the pump stations was set by the cubic feet per second (cfs) flow rate of each type of pump station, separate quantities and costs were computed for each type of pump station. Separate tabs for each pump station were created in the Excel spreadsheet (and subsequently shown in the MII MCACES format for each alignment). The cost for each pump station was divided by the flow rate to determine the unit cost. All cost estimates for Alignments A, C and D were computed in the same manner.

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

REAL ESTATE PLAN
APPENDIX C

Annex A: Project Maps
Annex B: Assessment of Non-Federal Sponsor's Acquisition Capability
Annex C: Approval of Non-Material Deviation from Standard Estate Temporary Access Easement & Perpetual Access Easement
Annex D: Approval of Non-Material Deviation from Standard Estate Flood Protection Berm Easement
Annex E: Facility/Utility Relocations
Annex F: NFS Risk Notification Letter

Contents

I. PURPOSE OF THE REAL ESTATE PLAN 3

II. PROJECT AUTHORIZATION 3

III. NON-FEDERAL SPONSOR 3

IV. PROJECT DESCRIPTION AND LOCATION 4

A. STRUCTURAL PROJECT FEATURES 5

1) LANDS, EASEMENTS, RIGHTS-OF-WAY, RELOCATIONS, DISPOSAL AREAS (LERRDS) .. 8

2) NON-FEDERAL SPONSOR OWNED LERRDs 11

3) ESTATES 12

B. LOCALIZED STORM SURGE RISK REDUCTION MEASURES 15

1) LANDS, EASEMENTS, RIGHTS-OF-WAY, RELOCATIONS, DISPOSAL AREAS (LERRDS) 17

2) NON-FEDERAL SPONSOR OWNED LERRDs 20

3) ESTATES 20

4) NON-STRUCTURAL FEATURE IMPLEMENTATION PLAN – FLOOD PROOFING 20

V. INDUCED FLOODING 22

VI. EXISTING FEDERAL PROJECTS WITHIN THE LERRDS REQUIRED FOR THE PROJECT 22

VII. FEDERALLY OWNED LANDS WITHIN THE LERRDS FOR THE PROJECT 22

VIII. NAVIGATION SERVITUDE 23

IX. BASELINE COST ESTIMATES/CHART OF ACCOUNTS (COAS) 23

X. UNIFORM RELOCATION ASSISTANCE (PL 91-646, TITLE II AS AMENDED) 26

XI. TIMBER/MINERAL/ROW CROP ACTIVITY 26

XII. OYSTER LEASES 27

XIII. ZONING ORDINANCES 27

XIV. ACQUISITION SCHEDULE 27

XV. FACILITY/UTILITY RELOCATIONS 29

XVI. HAZARDOUS, TOXIC AND RADIOACTIVE WASTE 31

XVII. LANDOWNER CONCERNS 31

XVIII. NFS RISK NOTIFICATION.....31

I. PURPOSE OF THE REAL ESTATE PLAN

This Real Estate Plan (REP) presents the real estate requirements and costs for the Final Integrated Feasibility Report and Environmental Impact Statement for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study (WSLP). The information contained herein is tentative in nature and for planning purposes only.

II. PROJECT AUTHORIZATION

Two Congressional resolutions authorize the Study. The first resolution was adopted on July 29, 1971, by the U.S. House of Representatives Committee on Public Works. The resolution reads:

> *"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Lake Pontchartrain and Vicinity, Louisiana, published as House Document No. 231, 89th Congress, First Session, and other pertinent reports, with a view to determining whether modifications to the recommendations contained therein are advisable at this time, with particular reference to providing additional levees for hurricane protection and flood control in St. John the Baptist Parish and that part of St. Charles Parish west of the Bonnet Carré' Spillway."*

The second resolution was adopted by the U.S. Senate Committee on Public Works on September 20, 1974. The resolution reads:

> *"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, that the Board for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Lake Pontchartrain and Vicinity, Louisiana, published as House Document No. 231, 89th Congress, First Session, and other pertinent reports, with a view to determining whether modifications to the recommendations contained therein are advisable at this time, for hurricane protection and flood control in St. James Parish."*

III. NON-FEDERAL SPONSOR

In 1998, the United States Army Corps of Engineers (USACE) and the Pontchartrain Levee District (PLD) executed a Feasibility Cost Sharing Agreement (FCSA) and Project Study Plan for the Study and was later amended in 2008. PLD has served as the Non-Federal Sponsor (NFS) for the feasibility study conducted under the terms of the FCSA. For purposes of the construction, and operation, maintenance, repair, rehabilitation and replacement (OMRR&R) of the Project, should it be authorized and funded, the Louisiana Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) is required to serve as the NFS.

Pursuant to Louisiana Revised State Statute 49:214.1 (F), the Louisiana Coastal Protection and Restoration Authority of Louisiana was established to serve as the State entity having jurisdiction over flood risk reduction, hurricane storm damage risk reduction and environmental restoration matters in coastal Louisiana. (Note that later enactments by the Louisiana legislature changed CPRA's statutory title to the Louisiana Coastal Protection and Restoration Authority of Louisiana Board (CPRAB). Further references will be to CPRAB, regardless of whether the matter under discussion occurred prior to or

after the date that the Legislature changed the designation to CPRAB.) The Coastal Protection and Restoration Authority (CPRA), formerly entitled the Office of Coastal Protection and Restoration (OCPR) serves, under the guiding authority of CPRAB, as the implementing agency of CPRAB. Among the implementation roles of CPRA is the authority to acquire and hold lands required to implement the mission of CPRAB.

CPRAB is required to provide all lands, easements, and rights-of-way, including those required for relocations, mitigation, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the Project (LERRDs), The Coastal Protection and Restoration Authority (CPRA), is the implementing agency of CPRAB, which has been given the authority to acquire and hold real property interests on behalf of CPRAB.

CPRAB does not have condemnation authority or "quick-take" authority. CPRAB understands that if condemnation should be needed to complete acquisitions for the project, CPRAB will need to partner with a levee district or Parish government which has that authority in order to fulfill its obligation as the NFS. If condemnation authority is required when the Real Estate acquisition process commences, CPRAB will need to enter into a cooperative endeavor agreement or other form of agreement with an entity that has quick-take condemnation authority to have that entity perform any quick-take condemnation measures on behalf of CPRAB that may be necessary for the Project.

Some of the Localized Storm Surge Risk Reduction Project features are voluntary in nature, specifically the home elevations and non-residential flood proofing measures. To participate in this project feature, owners must have clear title. There will be no condemnations for this portion of the Project either for price or to resolve title curative matters.

Assessment of CPRAB's Real Estate Acquisition Capability is attached hereto and incorporated herein by reference as Annex B. CPRAB has been found to be highly capable of performing acquisition of the LERRDS required for the Project.

In accordance with the requirements of ER 405-1-12, Chapter 12, Real Estate Roles & Responsibilities for Civil Works: Cost Shared and Full Federal Projects, CPRAB has been notified in writing of the risks of acquiring LERRDs before execution of the PPA.

IV. PROJECT DESCRIPTION AND LOCATION

The purpose of the study is to assess the need for hurricane and storm damage risk reduction measures in portions of St. Charles, St. John the Baptist, and St. James Parishes, Louisiana.

The recommended structural and Localized Storm Surge Risk Reduction measures of the Project are located within portions of St. Charles, St. John the Baptist, and St. James Parishes, Louisiana, within an area bounded on the east by the Bonnet Carré Spillway upper guide levee, on the north by Lakes Pontchartrain and Maurepas, on the west by the Ascension Parish and St. James Parish line, and on the south by the Mississippi River Levee (MRL) (Figure 1). Additionally, some of the mitigation features are located in Ascension and Livingston Parishes, Louisiana.

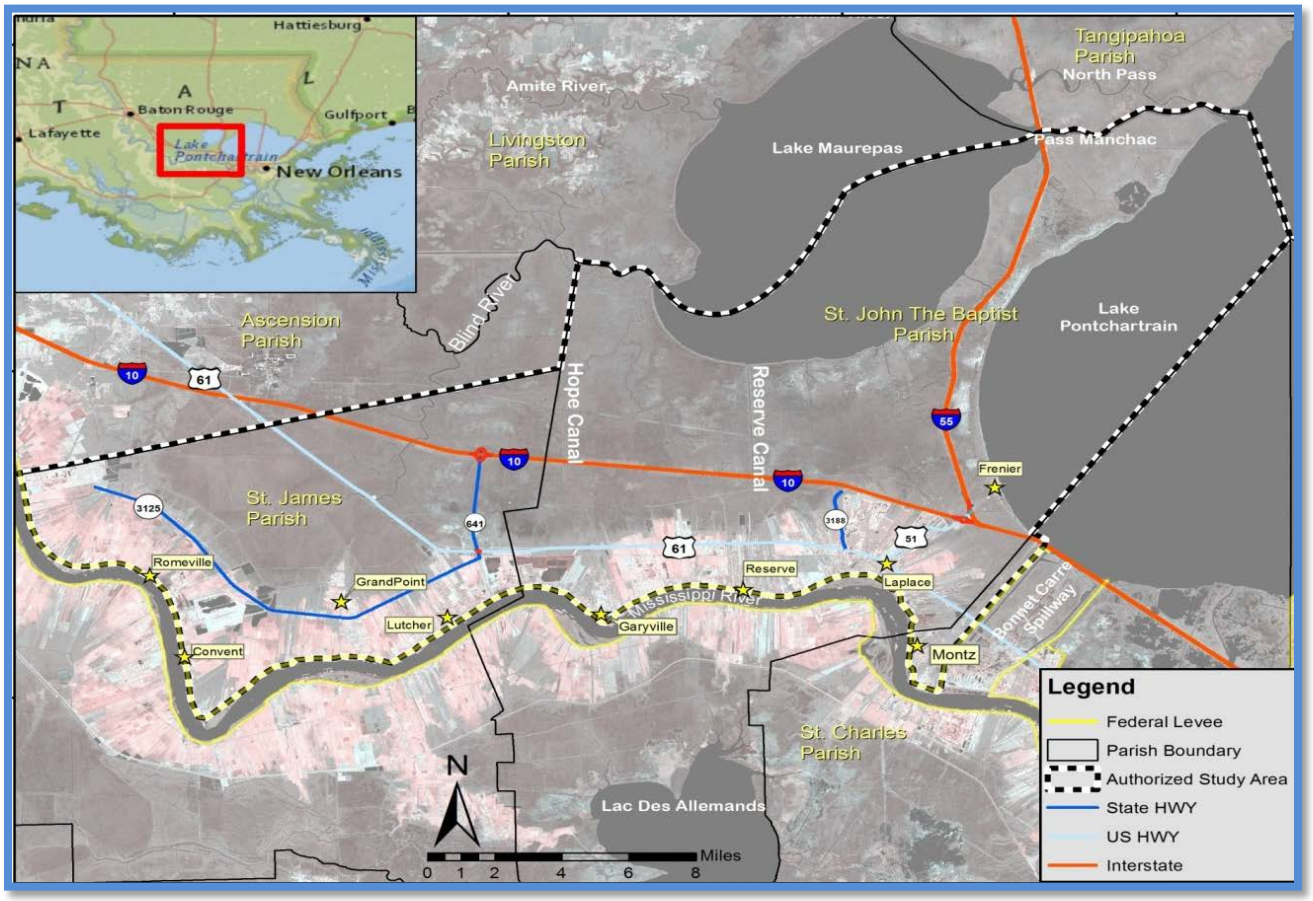


Figure 1: Study Area

The recommended hurricane storm damage risk reduction plan for the WSLP study includes the construction of an 18.27-mile (96,481 feet) levee system around the communities of Montz, Laplace, Reserve and Garyville. The recommended hurricane storm damage risk reduction plan also includes the construction of Localized Storm Surge Risk Reduction components in St. James Parish. The Project mitigation plan contains six components to provide required compensation for habitat impacts (further described in Section A-1 below). An overview of the recommended plan is shown in Annex A. This Report addresses structural and Localized Storm Surge Risk Reduction features of the recommended plan separately below.

A. STRUCTURAL HURRICANE STORM DAMAGE RISK REDUCTION PROJECT FEATURES

The structural hurricane storm damage risk reduction project features of the recommended plan are outlined in Figure 2 below. Additional maps of all features are located in Annex A of this Real Estate Plan.

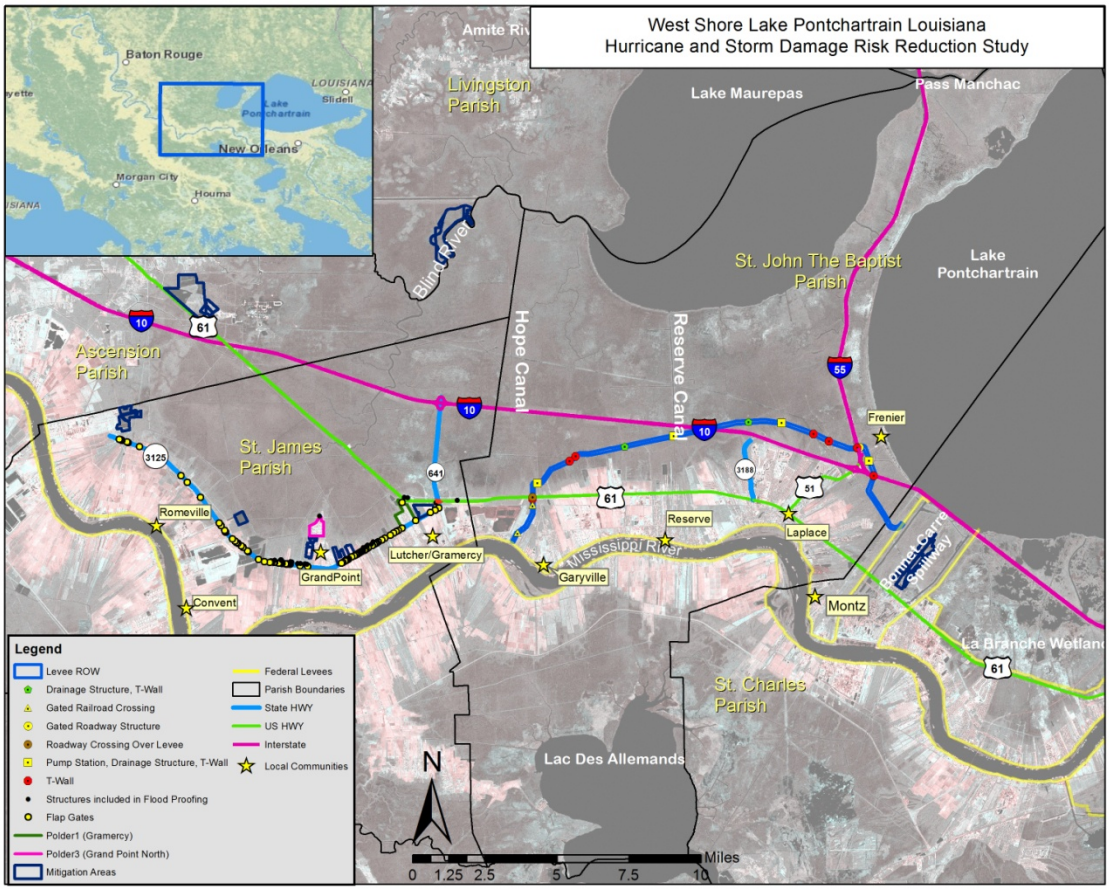


Figure 2: Recommended Plan – Structural Hurricane Storm Damage Risk Reduction Features (See Annex A for larger map)

Levee System

The levee system would begin at the upper guide levee of the Bonnet Carré Spillway, north of an underground utility pipeline right of way and US-61. The levee would head northwest paralleling the pipeline right of way and pass under I-10. Past I-10 the levee would enclose the I-10 and I-55 interchange and cross US-51. It would then track north of I-10 and a pipeline transmission corridor. Past the Belle Terre/I-10 exit, the levee would pass back under I-10 and parallel the pipeline corridor through wetlands until it crosses Hope Canal. The levee would then turn south; cross the pipeline transmission corridor and then extend to the Mississippi River Levee System (MRL).

The system would consist of earthen levees, floodwalls (T-Walls), floodgates, drainage canals, a flood-side ditch for hydraulic connectivity for wetlands north and south of the system, drainage structures and pump stations along the alignment, and mitigation measures (See Figure 5-2, Chapter 5 of the main report). Structures through the levee would be built to the 2070 intermediate RSLR condition, to prevent costly future retrofits required for anticipated changing sea levels.

Starting at the upper guide levee of the Bonnet Carré Spillway and heading west along the levee the project would construct a 646 linear foot (hereafter “LF”) T-Wall to pass under the existing I-10

overpass. Past this point, an 1100 c.f.s. pump station with three 68" outfalls would be built at Montz Canal, which is very near the I-55 northbound entrance ramp. The pump station, when the system is closed, would mainly remove rainwater flows from the Woodland, the River Forest, and the Prescott Canals. A 267 LF T-Wall and two 6' x 18' x 27' gated drainage structures would also be constructed at this location. This location and all locations with pump stations or drainage structures would be connected to a flood side ditch and a protected side canal that would parallel the entire levee length. The canals would be used to maintain the existing connection between swamps located inside and outside of the levee system. The protected side canal would also serve as a redundancy connection if one of the pump stations failed during an event.

Past the Montz Canal, at the location of US-51, a 188 LF gated structure would be placed through the levee. Directly west of US-51, a 247 LF T-Wall would cross under I-55. The levee would continue to the west until the levee intercepts the first pipeline crossings near Vicknair Canal. Two sections of T-Walls would be used for these pipeline crossing, a 550 LF T-Wall, and a 623 LF T-Wall. Half of the 35 required pipeline relocations would be at these two locations. For purposes of this report, it is expected that all of the pipeline relocations would be compensable. Relocations are expected to take place in the proposed levee right of way (ROW) or existing pipeline ROW. Determination of the compensability of these relocations will be determined during the engineering and design phase of this project if it is authorized.

Continuing west, the levee would then cross Ridgefield Canal. Ridgefield Canal is located between the I-10 LADOT weigh station and the I-10/LA 3188 exit. A 200 c.f.s. pump station with three 30" outfalls would be built at Ridgefield Canal. The pump station, when the system is closed, would mainly remove rainfall flows from Laplace Plantation, Perriloux, Ridgefield, Tebo and Vicknair canals. A 244 LF T-Wall and with two 6' x 18' x 267' gated drainage structures would also be constructed at this location.

West of the Ridgefield Canal, a 100 LF floodgate would be constructed at the location of the Perriloux Canal to allow rainfall flows to flow through the levee when the system is not closed.

West of the I-10/LA 3188 exit, a 247 LF T-Wall would be constructed to cross back under I-10. The levee would continue to parallel the pipeline corridor through wetlands until it reaches Reserve canal. A 400 c.f.s. pump station with three 48" outfalls would be built at this location. The structure at this location would also include two 6' x 20' x 25' drainage structure with a boat bay and 335 LF of T-Walls. Small boats would still be able to pass through the drainage structure when the system is open.

Continuing west, the levee would then cross Mississippi Bayou. A 6' x 10' x 25' drainage structure with a 267 LF T-Wall would be constructed at this location.

The levee would then continue west toward Hope Canal, until it reaches the next major set of pipeline crossings. All of the remaining major pipeline relocations would be at this location. Two sections of T-Walls would be used for these pipeline crossing, a 400 LF T-Wall, and a 300 LF T-Wall. As with the other pipelines, for purposes of this report, it is expected that the pipeline relocations would be compensable. Relocations are expected to take place in the proposed levee ROW or existing pipeline ROW at this location. Determination of the compensability of these relocations will be determined during the engineering and design phase of this project if it is authorized.

The levee would then continue west until it reaches Hope Canal. A 450 c.f.s pump station with three 54" outfalls would be constructed at this location. Currently the design and cost includes a 6' x 20' x 25' drainage structure and a 247 LF T-Wall, but the Hope Canal location is also the same location of the

State of Louisiana's proposed Mississippi Reintroduction into Maurepas Swamp diversion. The WSLP project has been coordinating activities between the project delivery teams, but for the purposes of the WSLP feasibility design, we do not consider the diversion project as a future landscape feature, since the State has not identified funding and has filed an incomplete permit application to the USACE for construction of the project. The USACE would continue to monitor the status of the diversion project. The team expects that if the diversion project moves forward it would be constructed on the flood side of the levee and would parallel the levee from Hope Canal to the MRL.

When the levee turns south, past Hope Canal to tie into the MRL, the levee would cross US-61, a pipeline ROW, and two railroad tracks. US-61 would be raised to hump over the levee at the crossing point. The pipeline crossing would include a 301 LF T-Wall, while the two railroad crossings would include a 150 LF gate structure and a 50 LF gate structure.

In all, there would be a total of 5,001 LF of T-Walls, 4 pump stations with associated drainage structures, 2 drainage structures, one gated road crossing, and 2 gated railroad crossings.

4.69 miles of the upper guide levee of the Bonnet Carré Spillway from the spillway control structure to the WSLP tie-in point would be included in the WSLP levee system, but there would be no construction activities associated with this Bonnet Carré levee. Existing levee heights are high enough to prevent 1% probability storm surge from entering the WSLP system during storms. The construction of the WSLP tie-in point would be to set to elevation of 15 ft NAVD 88 while the current upper guide levee elevation is 15.5 ft NAVD 88. The upper guide levee heights in the future would be monitored to determine if sections of the Bonnet Carré Spillway levee would need future lifts to prevent overtopping of storm surges into the WSLP system.

The 50 ft and 100 ft right of ways adjacent to the levee footprints would be used for future levee lifts. The levee would be lifted five times over the period of evaluation. The first two lifts would be used to obtain a 1% probability storm level of risk reduction system in 2020. Additional levee lifts to maintain a 1% probability storm level of risk reduction system would take place in years 2030, 2045, and in 2060.

9,000,000 cubic yards (cy) of compacted fill and un-compacted fill would be required to create and maintain the levee over the period of evaluation. A portion of the initial fill material, if suitable, would be obtained from the canals and ditch, approximately 1,678,000 cy. Borings indicate that the top 4 ft of the cross section of these features would not be suitable as levee fill material. The top 4 ft of material; approximately 1,685,000 cy, would be used beneficially at mitigation plan sites. The remaining fill for the levee, approximately 7,322,000 cy, would be obtained from the Bonnet Carré Spillway.

1) LANDS, EASEMENTS & RIGHTS-OF-WAY

The recommended structural plan alignment primarily impacts wetlands. A large portion of the alignment will be located on state-owned lands. An estimated 34 private landowners will be affected by the structural plan features.

The Project Delivery Team (PDT) worked to locate the ROW limits for the proposed levee sections to coincide with existing ROW from highways, pipelines, etc. in order to avoid remainder parcels that were non-functional to the landowners.

The total ROW required for the structural feature will be 1,235 acres (not including temporary access/work area easements as described below). A standard Perpetual Flood Protection Levee Easement will be acquired over 700 acres for the construction of the levee and T-walls, as well as the ROW necessary for the gates and underground piles associated with T-walls. A standard Drainage Ditch Easement will be acquired over 519 acres for two canals. For the pump stations, 9 acres will be acquired in Fee (Excluding Minerals).

Temporary access and work areas would be on existing roadways or developed areas of the project area. A standard Temporary Work Area Easement will be acquired for staging areas located on private lands. Mitigation areas will be acquired in Fee, Excluding Minerals. A non-material deviation will be made to the standard Road Easement to provide for the temporary, non-exclusive rights necessary for temporary access routes (refer to Annex C). For the road on top of the levee, which is for maintenance and not public access, a standard Flood Protection Levee Easement will be acquired.

The levee/floodwall feature of the project encloses a significant acreage of wetlands. These areas are continuously flooded areas. The District performed analysis of the water elevations in these areas, "with" and "without project" (as discussed in Section 4.1.1 of the feasibility report). Results of this analysis indicated that the topographical features of the wetland areas will remain relatively similar after the levee is constructed as they are today. As a result of this analysis, District Real Estate determined that the lands have not been damaged and no real estate rights have been taken from these landowners; therefore, no realty interests need to be acquired over the wetlands.

The District also performed analysis of the potential of adverse impacts associated with the use of the base flood plain, specifically the potential for induced development. Results of this analysis are discussed in Section 6.18 of the feasibility report. Based on this analysis, District Real Estate determined that it is highly unlikely that these areas will be developed in the future. The wetlands will remain inundated due to frequent flooding as a result of rainfall events. The cost of future development is likely to remain high, due to the amount of fill material that would be required in order to raise the elevation of the land to an acceptable level for development. There are existing available upland areas for development that are outside the project area, which could be developed at a much lower cost. In addition, this area would remain jurisdictional wetlands which would require compensatory mitigation for any wetland loss.

Additionally, the NFS has an obligation relating to the operation of the project, specifically in regards to the pump station capacities, to prevent encroachments that would impact the utility of the project. If induced development would change the hydrology of the flood plain, project features such as pump stations could be impacted. The NFS would have an obligation to comply with flood plain management requirements. Filling of wetland areas thru development could impact the function of the pump stations, and the NFS would have a responsibility to ensure that operation of the project features is maintained.

As a result of this analysis, no acquisition of realty interest is proposed over these enclosed wetland areas.

Table 1 below demonstrates the acreage, ownerships affected, and proposed estate for each project feature. The total estimated number of affected private landowners is 34.

Table 1: Acreage

Project Feature	# Acres	# Tracts/Ownerships	Proposed Estate
Access	49	24*	Temporary Access Easement/Perpetual Access Easement
Staging	12	12	Temporary Work Area Easement
Levee/T-wall	700	10	Perpetual Flood Protection Levee Easement
Conveyance Canal	519	10*	Drainage Ditch Easement
Gates	5	5*	Perpetual Flood Protection Levee Easement
Pump Stations	9	9*	Fee, Excluding Minerals
Mitigation	1,682	12	Fee, Excluding Minerals
Borrow	**	10**	Temporary Work Area Easement

**Landowners shown with an asterisk are assumed to be the same landowners that will be affected by the levee/t-wall features. Total estimated landowners affected by the structural features are 34.*
***Refer to discussion of Borrow within LERRDs descriptions below.*

ACCESS

Access for construction of the Project will be directly from the ROW of the Upper Guide Levee, US-51, US-61 and La. Hwy 44. Additional ROW will be required on private lands, affecting an estimated 12 private landowners (these owners are also impacted by the levee construction, staging, and/or mitigation). A Temporary Access Easement will be acquired for this portion of the Project.

Monitoring of some mitigation features may require perpetual access. Access area locations will be refined during PED; at this time, it is assumed that additional right of way will be acquired from 12 owners (these owners are also impacted by the levee construction, staging, and/or mitigation). A Perpetual Access Easement may be acquired for this portion of the Project. These estates are further discussed in Section A-3 below.

STAGING

The majority of staging areas for construction of this Project will be located within the ROW for the levee footprint or existing ROW. Additional ROW will be required within a few reaches. An estimated total of 12 private landowners will be affected. A standard Temporary Work Area Easement will be acquired for the additional ROW required for this portion of the Project.

BORROW

Borrow material for the Project would come from portions of the Bonnet Carré Spillway that area owned in fee by the Federal Government. In addition, suitable material excavated for construction of the drainage canal will be used for levee construction and mitigation. Borrow material for the project which is excavated from the construction of the drainage

canal will require acquisition of a Temporary Work Area Easement for borrow (in addition to the Drainage Ditch Easement). It is unknown at this time how many acres will be utilized for borrow within the drainage canal, or how many landowners will be affected (estimated maximum of 10 landowners).

MITIGATION

Details of the Project mitigation plan are outlined in Appendix A, Annex K of the Final Integrated Feasibility Report and Environmental Impact Statement. The plan contains six components to provide required compensation for habitat impacts. Below is a synopsis of the features; maps of these areas are included in Annex A of this REP:

- The first feature would mitigate for Bottomland Hardwood impacts through the construction of a project in the Bonnet Carré Spillway.
- Five features will collectively mitigate for swamp impacts. These features include purchasing credits from a mitigation bank and constructing five additional restoration projects:

  Blind River Swamp Restoration – Key parts of the restoration plan include planting native swamp canopy and midstory species on 1,040 acres, as well as installation of nutria guards on planted trees to protect against herbivore tree loss. A total of 1,040 acres will be required for this project feature, of which 1,010 acres are located on lands owned by the State of Louisiana and 30 acres are located on privately owned lands. This project feature is located in Livingston Parish. A total of 30 acres will be acquired in Fee (Excluding Minerals) for this feature. For the lands owned by the State of Louisiana, the NFS will provide the interests necessary for the project, and will receive credit for the lands it provides to the project.

  Bonnet Carré Swamp Restoration – This Project feature, located in St. Charles Parish, would create 310 acres of swamp using beneficial placement of dredged material and tree plantings. These lands are owned in fee by the Federal Government, and USACE is the managing agency over these lands.

  Maurepas Crawfish Ponds Swamp Restoration – This Project feature, located in Ascension Parish, would restore 1,161 acres of swamp through land grading and tree plantings. A total of 1,161 acres of privately owned lands will be acquired in Fee (Excluding Minerals) for this feature.

  Lutcher Polder Farmland Swamp Restoration – This Project feature, located in St. James Parish, would restore 348 acres of swamp through land grading and tree plantings. A total of 348 acres of privately owned lands will be acquired in Fee (Excluding Minerals) for this feature.

2) NON-FEDERAL SPONSOR OWNED LERRDs

CPRAB, a state agency, is required to provide all lands, easements, and rights-of-way, relocations, disposal and borrow areas (LERRDs), including those required for mitigation, and the disposal of dredged or excavated material. Portions of the levee footprint and

potential mitigation sites lie within lands owned by the State of Louisiana under the jurisdiction of various State agencies. The CPRAB will provide the necessary interests for the project, and will receive credit for the lands it provides to the project. CPRAB will be required to obtain the necessary agreements from any non-federal government entity, and provide Right of Entry to the Government.

3) ESTATES

The following standard estates will be required for the Project:

FEE EXCLUDING MINERALS (With Restriction on Use of the Surface)

The fee simple title to the land, subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines; excepting and excluding all oil and gas, in and under said land and all appurtenant rights for the exploration, development, production and removal of said oil and gas, but without the right to enter upon or over the surface of said land for the for the purpose of exploration, development, production and removal therefrom of said oil and gas.

This estate will be acquired for areas where pump stations will be constructed, as well as for areas to be acquired for mitigation. The District is of the opinion that this estate provides all the rights necessary for the project as well as protects the integrity of the project features. There are no active oil and gas wells within the project area, but it is unknown whether there are marketable minerals under the surface of the impacted properties. The District recognizes that if oil or gas were discovered, there is a possibility that the owner could develop those minerals through directional drilling. The District consulted with Louisiana Geological Survey regarding the feasibility of this process and potential impact to the surface of the project area. Because of depths involved in the drilling process (approximately 5,000 feet below the surface), directional drilling for minerals beneath the surface will have no impact on the surface. For a project of this size, directional drilling would be feasible. Given the acreages of the mitigation sites proposed for the project, the District verified that drilling to targets laterally can be achieved from up to 6 miles away. Extraction of minerals by existing conventional means would not impact the integrity of the project features.

Furthermore, the District believes that landowners may be less willing to sell the property if the mineral rights are acquired by the NFS. This in turn would require acquisition through condemnation which would increase the cost of the project. For planning purposes, we assume that the additional cost would be approximately $10,000 in labor for each tract that requires condemnation, to include title, curative work, preparation of condemnation assembly and assistance to Justice Department once the condemnation case is filed.

The risks to the project of not acquiring minerals are negligible; therefore, it is in the best interest of the Government to acquire Fee Excluding Minerals (with Restriction on Use of the Surface).

FLOOD PROTECTION LEVEE EASEMENT

A perpetual and assignable right and easement in (the land described in Schedule A) (Tracts Nos, ____, ____ and ____) to construct, maintain, repair, operate, patrol and replace a flood protection (levee) (floodwall)(gate closure) (sandbag closure), including all appurtenances thereto; reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

This estate will be acquired for areas where the levee, floodwall, gates, and the underground piles will be constructed. The underground piles are considered an appurtenance of the floodwall. This easement prohibits any use of the surface or subsurface which interferes with the project.

DRAINAGE DITCH EASEMENT

A perpetual and assignable easement and right-of-way in, over and across (the land described in Schedule A) (Tracts Nos. ____, ____ and _____) to construct, maintain, repair, operate, patrol and replace a drainage ditch, reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

A drainage ditch will be constructed adjacent to the levee in order to provide drainage to protected areas. Portions of the excavated material will be used to construct the levee and the mitigation sites.

TEMPORARY WORK AREA EASEMENT

A temporary easement and right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. _____, _____ and _____), for a period not to exceed _____, beginning with date possession of the land is granted to the Coastal Protection and Restoration Authority Board (CPRAB), for use by the CPRAB and the United States of America, its representatives, agents, and contractors as a (borrow area) (work area), including the right to (borrow and/or deposit fill, spoil and waste material thereon) (move, store and remove equipment and supplies, and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the _____ Project, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

This estate will be acquired over areas to be used for staging.

TEMPORARY ACCESS EASEMENT (Non-Material Deviation from Standard Estate)

A non-exclusive and assignable temporary easement for a period not to exceed _____years beginning with date possession of the land is granted to the Coastal Protection and Restoration Authority Board (CPRAB), for use by the CPRAB and the United States of America, its representatives, agents, and contractors as an access route and/or right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. _____, _____ and _____); together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way, reserving, however, to the owners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired, including the right to cross over the right-of-way as access to their adjoining land; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

This estate will be acquired over existing privately owned roads that are used for access to the project during construction. The estate with approval signatures by the Chief of Real Estate for the Temporary Access Easement (Non-Material Deviation from Standard Estate) is attached as Annex C.

PERPETUAL ACCESS EASEMENT (Non-Material Deviation from Standard Estate)

A perpetual non-exclusive and assignable easement for use by the Coastal Protection and Restoration Authority Board (CPRAB) and the United States of America, its representatives, agents, and contractors as an access route and/or right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. _____, _____ and _____); together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way, reserving, however, to the owners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired, including the right to cross over the right-of-way as access to their adjoining land; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

This estate will be acquired over certain existing privately owned roads to allow for access to the project for operation and maintenance. The estate with approval signatures by the Chief of Real Estate for the Perpetual Access Easement (Non-Material Deviation from Standard Estate) is included within Annex C.

B. LOCALIZED STORM SURGE RISK REDUCTION PROJECT FEATURES

The Localized Storm Surge Risk Reduction Project features are outlined in Figure 3 below. Additional maps of all features are located in Annex A of this Real Estate Plan.

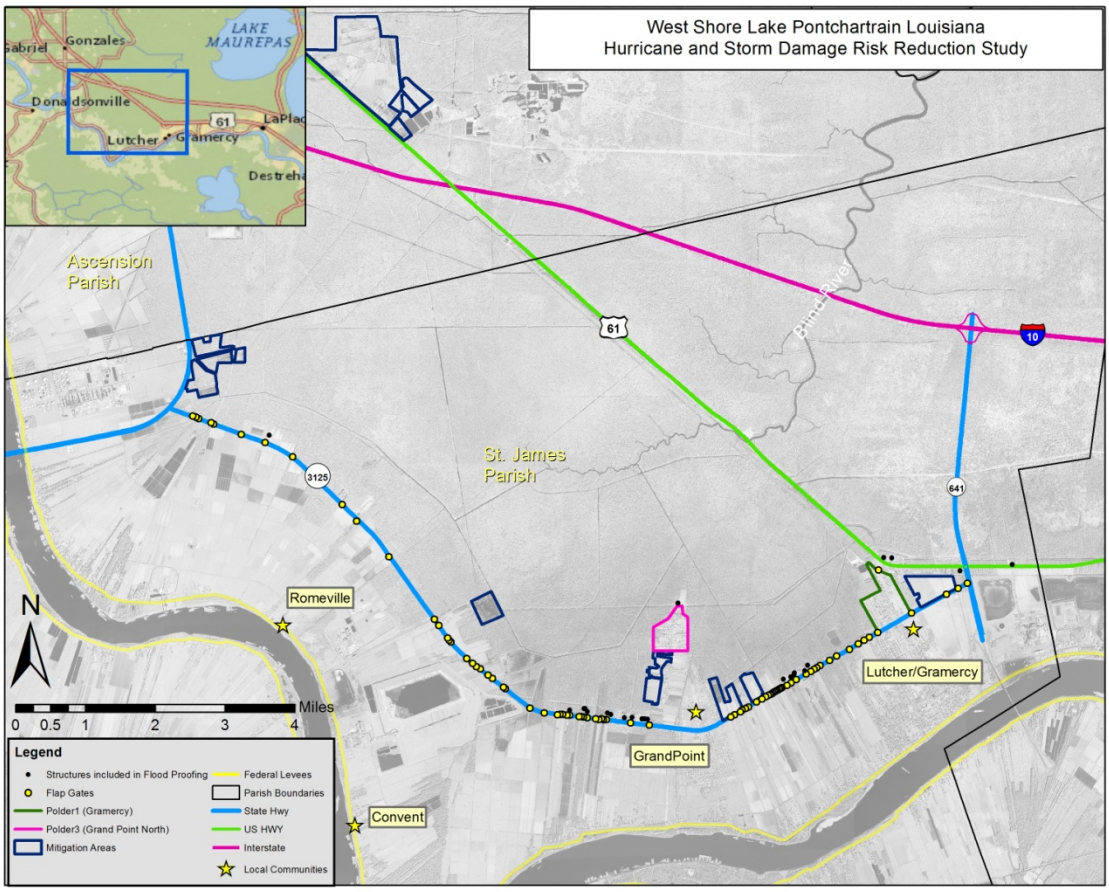


Figure 3: Recommended Plan – Localized Storm Surge Risk Reduction Features
(See Annex A for larger map)

Polder 1 (Gramercy Berm):

In the Gramercy area, north of Hwy 3125, a 10,100 LF berm would be built to provide risk reduction to 275 structures, herein referred to as "**Polder 1 (Gramercy Berm)**." The berm would be constructed to a +6.5' NAVD 88 elevation. The berm in 2020 would provide risk reduction above the 1% AEP storm stages. Storm stages in St. James Parish are below +6.5' NAVD 88 elevation in 2020. As discussed in Chapter 3, in the future, the berm's effectiveness depends on the actual rate of RSLR.

The berm would parallel both sides of Hwy 20, and parallel the railroad track along US-61 (Airline Highway). To the south, the berm would tie into Hwy 3125 to close off the system. Hwy 3125 is key feature for all of the Localized Storm Surge Risk Reduction features. The entire roadway is above a 6.5 ' NAVD 88 elevation and will be used as a tie in point for the berm. The design of the berm is based on a

4' wide crown and 3:1 side slopes. Using local LIDAR data it was assumed that the existing ground elevation under the berm would be at an elevation of approximately 4.3 ft NAVDD88. Using this assumption, the proposed berm would have an average height of 2.2 ft with an average width of 18 ft, and require 237,000 cy of compacted fill for construction. The berm would also include two floodgates to allow existing drainage to flow through the berm when not under surge events. A pump system to operate and remove rainwaters during tropical/hurricane storm events will be included in the features. The pump system will be approximately 217 cfs. The berm would be placed in a location so as not to interfere with existing local drainage.
In reviewing the berm footprint, there is a risk of affecting approximately 0.29 acres of forested wetlands. Attempts would be made to avoid these areas during construction. Due to the current uncertainty in avoiding these areas, we have included cost for mitigating for these forested wetlands in the total construction cost.

Polder 3 (Grand Point North):

Polder 3 (Grand Point North) would provide risk reduction to 71 structures. The berm would be a complete ring around the structures in the northern portion of Grand Point, near the Grandpoint Boat Launch. The berm would be 10,400 LF, and would include a 4' wide crown and 3:1 side slopes. The berm would be constructed to a 6.5' NAVD 88 elevation. Initially, in 2020 the berm would provide risk reduction above the 1% AEP storm stages. Storm stages St. James Parish are below a 6.5‘ NAVD 88 elevation in 2020. Future level of risk reduction is dependent on the actual rate of RSLR.

Using local LIDAR data it was assumed that the existing ground elevation under the berm would be approximately 4‘ NAVD 88. Using this assumption, the proposed berm would have an average height of 2.5 ft with an average width of 20 ft, and require 286,800 cy of compacted fill for construction. The berm would also include one floodgate to allow existing drainage to flow through the berm when not under surge events. A pump system to operate and remove rain waters during tropical/hurricane storm events will be included in the features. The pump system will be approximately 140 cfs. The berm would be placed in a location so as not to interfere with existing local drainage. The berm would also be placed very near the edge of the property owners’ parcels where feasible. This would minimize the loss of use of any property.

In reviewing, the berm footprint there is a risk of affecting approximately 0.81 acres of forested wetlands. Attempts would be made to avoid these areas during construction. Due to the current uncertainty in avoiding these areas, we have included cost for mitigating for these forested wetlands in the total construction cost.

Hurricane Storm Damage Risk Reduction Under LA Highway 3125:

In addition to the berms north of Hwy 3125, the recommended plan is to use 13 miles of Hwy 3125 and its existing foundation as a Localized Storm Surge Risk Reduction feature. The roadway elevation is above a 6.5' NAVD 88 elevation. Currently, the 1% AEP storm stages in 2020 flow through the culverts under the roadway in the opposite direction from natural drainage. By closing off the culverts with one-way flap gates and a drainage canal with a floodgate during surge events, the plan would provide risk reduction to 19,500 acres and 4,295 structures south of Hwy 3125. Although there are a limited number of structures that are impacted by the 1% AEP storm surge stages, this closure reduces the risk of a large portion of the parish’s critical sugarcane crops from flooding from this type of storm surge event. If in the future, the Parish makes improvements to Hwy 3125, any additional height added to the entire

highway could add to the structures risk reduction level behind the highway. Due to the fact that the roadway is being used as hurricane storm damage risk reduction feature the NFS will be required to maintain the system's initial level of risk reduction. This includes the berm tie in points to the roadway and 13 miles of the roadway. If the roadway requires maintenance and would be degraded below its original elevation, the work should take place outside of hurricane season. If it is not possible to workout side of hurricane season, interim storm surge risk measures should be set up to maintain the original level of risk reduction provided by the roadway.

The recommended plan includes 145 flap gated closures, two floodgates and two small berms (Noranda and Uncle Sam). The Noranda berm ties the highway into high ground east of Gramercy. The Uncle Sam berm divides the developed area behind Hwy 3125 from an area that is primarily agricultural land. By dividing these two areas, the local community can focus its reduction effort in the future. Future improvements could be focused on sections of the highway that have structures behind the highway, approximately 7 miles vs. 13 miles. The area west of the Uncle Sam berm includes an area of 8,175 acres, but only includes one structure that has a first floor elevation below the 1% the AEP storm stages. The total length of the berms is approximately 645 LF.

Due to the nature of the flooding south of Hwy 3125, it is assumed that the 19,500 acres would have ample storage capacity to hold any rainfall during the surge events. Even if some acres of crops are flooded from rainfall, it would be much less than if the surge was allowed to flow under Hwy 3125.

Remaining Structures in St. James Parish:

The recommended plan addresses the flooding of structures located outside of the polders north of Hwy 3125. Eighty structures were evaluated outside of the berms. Only 23 of the 80 structures have a first floor elevation less than the 1% AEP storm stages in 2020. Based on this evaluation the recommended plan includes 14 residential structures that would be raised to the stage associated with the 2070 1% (100-year) AEP event; 4 non-residential structures would be flood proofed to 3 feet above the ground elevation; and smaller berms would be constructed for 5 light industrial/warehouse facilities. The 14 residential structures are being raised to the 2070 height because it is more cost effective to raise a home once.

1) LANDS, EASEMENTS, RIGHTS-OF-WAY, RELOCATIONS, & DISPOSALS

Polders 1 and 3 will primarily impact developed residential lands, affecting an estimated 106 landowners. It is the intent of the Project to place the berms as close as possible to property lines in order to minimize possible severance damages to properties. No relocation of utility lines will be necessary for this portion of the work because utilities are located along the public streets. The polder entitled "Hurricane Storm Damage Risk Reduction Under LA Highway 3125" includes 145 flap gate culvert closures, 2 flood gates, and 2 small berms (Noranda and Uncle Sam). The flap gates and flood gates will be constructed on lands owned by the State of Louisiana. Noranda will be constructed on lands owned in part by the State of Louisiana, as well as 1 private landowner. Uncle Sam will be constructed on primarily agricultural lands, and will affect 1 private landowner.

Because Polder 1 ties in to La. Highway 3125 (refer to "Hurricane Storm Damage Risk Reduction Under LA Highway 3125" in the project description above), the District

acknowledges that there is a need for a real estate instrument which would ensure the roadway elevation is maintained in place, regardless of whether there is a continuing need for the Highway. Additionally, the real estate instrument should ensure that the State (LADOTD) does not degrade the Highway below 6.5 foot elevation. In the event that there is a temporary degradation for maintenance or rebuilding of the Highway, this should not be done during hurricane season, or must be done in a limited manner, so that the Highway could be raised during a storm event.

This instrument would be signed by the NFS, and the Louisiana Department of Transportation. Further, the instrument will include specific language agreeing to this requirement. At the time of this report, the District had not conducted discussions with the NFS or LADOTD regarding this issue. Therefore, District Office of Counsel was not able to develop the language that would be required in the instrument. The District recognizes that design of this feature must be coordinated with the NFS and with LADOTD. Discussions will occur during PED once there is more detail available regarding the design. At that time, Office of Counsel will also develop the language of the instrument to be signed by both parties and will coordinate such with the Real Estate and Office of Counsel vertical team. A Request for Approval of a Non-Standard Estate will be submitted to CEHQ-RE for approval.

Additionally, there are approximately 23 structures remaining outside of the Localized Storm Surge Risk Reduction features with a first floor elevation less than the 6.5 foot NAVD 88 elevation. These structures will be flood proofed to the stage associated with the 2020 100-year event. The recommended plan includes 14 residential structures to be elevated so that the lowest habitable finished floor is at least one foot above the Base Flood Elevation and to the stage associated with the 2070 1% (100-year) ACE event; 4 non-residential structures would be flood proofed to 3 feet above the ground elevation; and smaller berms would be constructed for 5 light industrial/warehouse facilities.

Table 2 below demonstrates the acreage, ownerships affected, and proposed estate for each Localized Storm Surge Risk Reduction Project feature. The total estimated number of affected private landowners is 131.

Table 2: Localized Storm Surge Risk Reduction Features

Project Feature	# Acres	# Tracts/ Ownerships	Proposed Estate
Polder 1	4.17	57	Perpetual Berm Easement*
Polder 3	4.78	49	Perpetual Berm Easement*
Flood Control Under 3125:			
Flap Gates/Flood Gates	27.90	NFS Owned	**
Noranda	.22	1	Perpetual Berm Easement*
Uncle Sam	.07	1	Perpetual Berm Easement*
Residential Elevations		14	Flood Proofing Agreement
Commercial Flood Proofing		9	Flood Proofing Agreement

**This is a non-material deviation from the standard perpetual Flood Protection Levee Easement. Refer to Annex F. Refer to Section B-3 below for further discussion.*
***Refer to discussion in Section B(1) above regarding specific language needed in the instrument to be signed between the NFS and LADOTD.*

ACCESS

Access for construction of the Localized Storm Surge Risk Reduction features will be directly from the adjacent public ROW and within ROW acquired for construction of the Project features. No private lands will be required for access.

STAGING

Staging areas for construction of the Localized Storm Surge Risk Reduction Project features will be located within the ROW for the Project footprint. No additional ROW will be required.

BORROW

All borrow material for this feature of the Project would come from the Bonnet Carré Spillway, which is owned in fee by the Federal Government.

MITIGATION

Mitigation for construction of the Localized Storm Surge Risk Reduction Project features is included within the Project mitigation plan, as described in Section A-1 and in Appendix A, Annex K of the Final Integrated Feasibility Report and Environmental Impact Statement. In Polder 1, there is a risk of affecting approximately 0.29 acres of forested wetlands. Attempts will be made to avoid these areas during construction. Due to the current uncertainty in avoiding these areas, we have included cost for mitigating for these forested wetlands in the total construction cost.

In reviewing Polder 3, the footprint of the berm, there is a risk of affecting approximately 0.81 acres of forested wetlands. Attempts will be made to avoid these areas during

construction. Due to the current uncertainty in avoiding these areas, we have included cost for mitigating for these forested wetlands in the total construction cost.

2) NON-FEDERAL SPONSOR OWNED LERRDs

Portions of the Localized Storm Surge Risk Reduction footprint and potential mitigation sites lie within lands owned by the State of Louisiana. The Non Federal Sponsor will provide the necessary interests for the project, and will receive credit for the lands it provides to the project.

3) ESTATES

Flood Protection Berm Easement *(Non-Material Deviation from Standard Estate)*

The Localized Storm Surge Risk Reduction Project features include construction of several berms to provide risk reduction to residential structures in St. James Parish. Typically, a berm is constructed as a part of a levee, and the standard perpetual Flood Protection Levee Easement is acquired for both the levee and the berm.

Due to the nature of the berms proposed for this Project, the District has prepared a Non-Material Deviation to the standard perpetual Flood Protection Levee Easement, replacing the word "levee" with the word "berm". A copy of the approved Non-Material Deviation to Standard Estate is included in Annex D.

The language of the Flood Protection Berm Easement is as follows:

> *A perpetual and assignable right and easement in (the land described in Schedule A) (Tracts Nos, ____, ____ and ____) to construct, maintain, repair, operate, patrol and replace a flood protection berm, including all appurtenances thereto; reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.*

It is noted that the Flood Protection Berm easement is proposed for the berms, but does not include the areas of the project feature located on Highway 3125. A separate instrument will be acquired for those features, as discussed in Section B-1 above.

4) LOCALIZED STORM SURGE RISK REDUCTION FEATURE IMPLEMENTATION PLAN – FLOOD PROOFING OF RESIDENTIAL STRUCTURES (ELEVATION) AND FLOOD PROOFING OF NON-RESIDENTIAL STRUCTURES (BERMS)

The Localized Storm Surge Risk Reduction Project features include 23 structures in the Project area. CPRAB will be the implementing agency for the elevations and commercial flood proofing measures.

District Real Estate performed a preliminary review of structures in the Project area. Based on this information, it is assumed that all of the structures eligible for elevation will be structurally sufficient to withstand elevation. Further, the District performed an analysis comparing the preliminary costs of structure elevation with preliminary depreciated value of

the structures and for each structure the lower cost was structure elevation. Therefore, for this Project it is not anticipated that there will be any property buy-outs.

Property owner participation in the Localized Surge Risk Reduction mearsures will be completely voluntary. The owners will be required to submit an application for residential structure elevation or commercial flood proofing, which must be signed by all owners of the property that would be impacted by the estate acquired in the Flood Proofing Agreement (including the Covenant Running With the Land). In order for an owner to participate in the residential elevation or the commercial flood proofing, the owner must have legal possession of the property without title defect. Title will be researched by the implementing agency. If a property is mortgaged, the owner must obtain approval from the mortgagor to participate in the structure elevation or floodproofing. The implementing agency will also conduct an appraisal as well as a site inspection to complete a Phase I HTRW/Asbestos investigation, and determine the condition and suitability of the structure for elevation or flood proofing. Landowners will obtain bids from qualified licensed contractors for the work to be performed. A Flood Proofing Agreement, which will include a Covenant Running With the Land, will be executed between the property owner, 3rd party interests impacted by the Covenant, and the NFS. The implementing agency will obtain subordinations from 3rd party interests impacted by the restrictions of the covenant. It is expected that occupants will need to temporarily relocate from their residences while the structure is being elevated. A complete implementation plan will be formulated during PED.

Flood Proofing Agreement

The District, under advisement from CEMVD and CEHQ, will modify a sample Flood Proofing Agreement that has been used by an implementing entity in conjunction with another Corps project, to include provisions applicable to the West Shore Lake Pontchartrain Project. Other Flood Proofing Agreements have been used for projects at the Nashville District, Omaha District and Mobile District.

The terms and conditions of the Flood Proofing Agreement will contain provisions that represent an interest in real property. In addition to provisions relating to the actual flood proofing action and construction, the agreement will include provisions regarding the right of NFS to access the property, to survey, investigate HTRW, inspect and monitor the property. Additionally, the agreement will include a covenant running with the land. The covenant will represent an interest in real property that will ensure that the flood proofed structures remain at the prescribed elevation and to ensure that all future construction or modifications to the flood proofed structure or elsewhere on the lands containing the flood proofed structures are performed in accordance with the project requirements. The Flood Proofing Agreement will be developed, in coordination with CEMVD and CEHQ, during PED to establish the program requirements and to conform to the scope of work that is determined for elevation of residential structures and flood-proofing measures for non-residential and light industrial structures. The individual property owners electing to participate in flood proofing of individual structures will enter into the agreement with the NFS. The Agreement, inclusive of the covenant running with the land, will be recorded in the Conveyance Records of the Parish where the property is located. At this time, it does not appear that any additional real estate interest will be acquired; however, that determination will be finalized during PED.

V. INDUCED FLOODING

Pump stations will be used to maintain existing drainage patterns in that portion of the Project area that is located on the protected side of the structural levee/floodwall system. Operation of these pump stations will be limited to such operations as are necessary to avoid Project construction-induced flooding on the protected side of the structural levee/floodwall system.

Modeling results indicated that the impacts to surrounding communities would be similar with and without the WSLP Project features and the magnitude in changes in water level are less than model precision.

There is a margin of error in both the economic model and the storm surge modeling (ADCIRC) which is recognized by team hydrologists and economists. In general, the potential impacts to communities outside of the proposed levee alignment would be similar with and without Alignment C. The ADCIRC modeling will be refined during PED to determine whether or not there will be induced flooding and to precisely estimate its magnitude. At feasibility level of design, the model uncertainty and inclusion of Localized Storm Surge Risk Reduction features adequately addresses the limited potential for induced damages. Therefore, a Takings Analysis has not been prepared for the Project.

VI. EXISTING FEDERAL PROJECTS WITHIN THE LER REQUIRED FOR THE PROJECT

Mississippi River & Tributaries Project

The levee feature of the project will tie into the Mississippi River Levee, which is a part of the Mississippi River and Tributaries Project, which was authorized by the Federal Flood Control Act of 1928. The Pontchartrain Levee District holds easements for the existing Right of Way that are equivalent to a levee easement. The Pontchartrain Levee District holds sufficient rights for the needs of the project, and will provide Right of Entry to CPRAB over this portion of the project.

Bonnet Carré Spillway

Portions of the structural project features as well as mitigation project features lie within the boundaries of the Bonnet Carré Spillway, on lands that are owned by the United States and are managed by USACE. This is further discussed in Section VII below.

VII. FEDERALLY OWNED LANDS WITHIN THE LER FOR THE PROJECT

The levee feature of the project will tie into the Bonnet Carré guide levee, and some project mitigation features lie within the Bonnet Carré Spillway. In addition, borrow material for the Project would come from the Bonnet Carré Spillway. The lands within the Spillway that are required for the Project are owned in fee by the Federal Government. USACE is the managing agency over this land.
CPRAB will be responsible for Operation & Maintenance of the mitigation features which lie within the Bonnet Carré Spillway. The Government will provide an outgrant to perform Operation & Maintenance of the mitigation site.

VIII. NAVIGATION SERVITUDE

The navigation servitude is the dominant right of the Government under the Commerce Clause of the U.S. Constitution to use, control and regulate the navigable waters of the United States and submerged lands thereunder.

The Project does not require LERRDs within any navigable watercourses. Therefore, the Federal Navigational Servitude will not be invoked for this Project.

IX. BASELINE COST ESTIMATES/CHART OF ACCOUNTS (COAs)

The Chart of Accounts includes lands required for the project (shown in the 01 – Lands and Damages account), as well as lands required for mitigation (shown in the 06 – Wildlife and Fisheries account). The Chart of Accounts also provides Relocations costs, which are the responsibility of the NFS (shown in the 02 – Relocations account).

The estimated total cost for Real Estate Acquisition is $27,679,000. This includes $5,481,000 for the structural features, $3,521,000 for Localized Storm Surge Risk Reduction features, $18,132,000 for mitigation and $545,000 for administrative costs associated with the flood proofing measures.

The costs for structural features include land payments as well as administrative costs and incremental costs associated with acquiring the real estate interests, as well as costs for potential condemnations. Costs for the Localized Storm Surge Risk Reduction features include land payments as well as administrative costs and incremental costs associated with acquiring the real estate interests, as well as costs for potential condemnations associated with acquisition of rights for the berms.

Costs for the Localized Storm Surge Risk Reduction flood proofing measures include administrative costs associated with implementation of the recommended plan. This would include such items as procurement of title, title review, preparation, execution, and recordation of the Flood Proofing Agreement (which includes a covenant running with the land), issuance of payment to the owner/contractor, and subsequent inspections to ensure the work was performed in accordance with the Flood Proofing Agreement. Administrative costs for these real estate tasks (to be performed by the NFS) were estimated at $10,000 for each structure, plus a contingency.

Because real estate costs did not exceed 10% of total project costs, a gross appraisal was not prepared for this Project. LERRDs costs are based on cost estimates prepared by the Appraisal Branch in June 2014.

Relocations costs are reflected in the 02-Relocations account. Refer to the section entitled “Facility/Utility Relocations” for information regarding the costs associated with these relocations.

					AMOUNT (ROUNDED)	CONTINGENCY (ROUNDED)	PROJECT COST
			CONTINGENCY	PROJECT COST			
01	**LANDS AND DAMAGES**				**7,453,000**	**2,094,000**	**9,547,000**
STRUCTURAL FEATURES					4,232,000	1,249,000	5,481,000
Assumes 22 landowners affected							
01B	ACQUISITIONS						
01B20	BY NON-FEDERAL SPONSOR (NFS)	187,000	46,750	233,750			
01B40	REVIEW OF NFS	99,000	24,750	123,750			
01C	CONDEMNATIONS						
01C20	BY NFS	55,000	13,750	68,750			
01E	APPRAISAL						
01E30	BY NFS	44,000	11,000	55,000			
01E50	REVIEW OF NFS	22,000	5,500	27,500			
01F	PL 91-646 ASSISTANCE						
01F20	BY NFS	0	0	0			
01R	REAL ESTATE PAYMENTS						
01R1	LAND PAYMENTS						
01R1B	BY NFS	3,825,000	1,147,500	4,972,500			
01R2	PL 91-646 ASSISTANCE PAYMENTS						
01R2B	BY NFS	0	0	0			
LOCALIZED RISK REDUCTION FEATURES					2,785,000	736,000	3,521,000
Assumes 108 landowners affected; does not include home elevations							
01B	ACQUISITIONS						
01B20	BY NON-FEDERAL SPONSOR (NFS)	918,000	229,500	1,147,500			
01B40	REVIEW OF NFS	486,000	121,500	607,500			
01C	CONDEMNATIONS						
01C20	BY NFS	270,000	67,500	337,500			
01E	APPRAISAL						
01E30	BY NFS	216,000	54,000	270,000			
01E50	REVIEW OF NFS	108,000	27,000	135,000			
01F	PL 91-646 ASSISTANCE						
01F20	BY NFS	0	0	0			
01R1	LAND PAYMENTS						
01R1B	BY NFS	787,000	236,100	1,023,100			
01R2	PL 91-646 ASSISTANCE PAYMENTS						
01R2B	BY NFS	0	0	0			
LOCALIZED RISK REDUCTION HOME ELEVATIONS					436,000	109,000	545,000
Assumes 23 landowners affected; includes administrative costs only							
01B	ACQUISITIONS						
01B20	BY NON-FEDERAL SPONSOR (NFS)	345,000	86,250	431,250			
01B40	REVIEW OF NFS	91,000	22,750	113,750			
02	**RELOCATIONS**				**14,768,000**	**4,430,000**	**19,198,000**
02	RELOCATIONS	14,768,000	4,430,000	19,198,000			
06	**WILDLIFE & FISHERIES**						
MITIGATION					**13,957,000**	**4,175,000**	**18,132,000**
Assumes 12 landowners affected							
01B	ACQUISITIONS						
01B20	BY NON-FEDERAL SPONSOR (NFS)	102,000	25,500	127,500			
01B40	REVIEW OF NFS	54,000	13,500	67,500			
01C	CONDEMNATIONS						
01C20	BY NFS	60,000	15,000	75,000			
01E	APPRAISAL						
01E30	BY NFS	24,000	6,000	30,000			
01E50	REVIEW OF NFS	12,000	3,000	15,000			
01F	PL 91-646 ASSISTANCE						
01F20	BY NFS	0	0	0			
01R1	LAND PAYMENTS						
01R1B	BY NFS	13,705,000	4,111,500	17,816,500			
01R2	PL 91-646 ASSISTANCE PAYMENTS						
01R2B	BY NFS	0	0	0			

X. UNIFORM RELOCATION ASSISTANCE (PL 91-646, Title II as amended)

No relocation assistance benefits are anticipated for the structural features of the Project. No families or businesses will be displaced as a result of the structural project features.

Because participation in the Localized Storm Surge Risk Reduction project flood proofing feature is voluntary, the owner-occupants are not eligible for relocation assistance benefits, in accordance with the Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally-Assisted Programs (URA), as promulgated by 49 CFR Part 24, paragraphs 24.2(a)(9)(ii)(D), (E), (H), 24.101(a)(2), and applicable sections in Appendix A. However, if the owner of a leased residential property participates in the structure elevation, the tenant is considered displaced and is eligible for relocation assistance.

Below is an excerpt of the applicable portions of 49 CFR Part 24 as they relate to owner-occupants:

49 CFR Part 24:

> (1) Subpart A, paragraph 24.2(a)(9)(ii)(E), Persons Not Displaced definition, states that an owner-occupant who moves as a result of an acquisition of real property that will not be acquired if an agreement cannot be reached, or as a result of rehabilitation of the real property, is not a displaced person. However, the displacement of a tenant as a direct result of any acquisition, rehabilitation or demolition for a Federal or Federally-assisted project is subject to the URA as a displaced person; and (H) states that an owner-occupant who conveys his or her property...after being informed in writing that if a mutually satisfactory agreement on terms of the conveyance cannot be reached, the Agency will not acquire the property. In such cases, however, any resulting displacement of a tenant is subject to the URA as a displaced person; and
>
> (2) Subpart B, paragraphs 24.101(a)(2), (b)(1)(iii), & (b)(2)(i), Applicability of Acquisition Requirements, states that if the agency will not acquire a property because negotiations fail to result in an agreement, the owner of such property is not a displaced person and as such, is not entitled to relocation assistance benefits. However, tenants on such properties may be eligible for relocation assistance benefits.
>
> (*Note the above paragraph is intended to stress that if an agency will not use condemnation as an acquisition tool, then an owner-occupant is not considered a displaced person; conversely, even if an agency does not utilize condemnation as an acquisition tool, tenants may be considered displaced persons. It is understood that if an owner does not participate in the program, then a tenant would not be displaced and would not qualify for relocation assistance.)*

XI. TIMBER/MINERAL/ROW CROP ACTIVITY

The Louisiana Department of Natural Resources provides a Strategic Online Natural Resources Information System (SONRIS), which contains up-to-date information on oil & gas activity in the state of Louisiana. Review of this information indicated that although there are oil and gas wells within the

study area, there are no active wells within the recommended plan alignment. This information will be reviewed and confirmed following feasibility level design.

With the exception of the acquisition of the standard Fee Excluding Minerals Estate (With Restrictions on the Use of the Surface) which has the potential to impact mineral rights over certain lands, the other estates have no impact on mineral rights and USACE will not acquire mineral rights to any of the LERRDs required for the Project. Over lands where the fee estate is being acquired, mineral rights will be subordinated. Mineral right owners can still explore for minerals through directional drilling.

There are approximately 404 acres of agricultural land impacted by the Project. Property owners will be allowed to harvest crops prior to acquisition. In the event that Project schedules do not allow for such, the contributory value of the in crops will be included in the estimate of property value in the appraisal. Any timber present within required right of way is included in the overall appraised value of the land.

XII. OYSTER LEASES

There are no oyster leases located within the Project study area.

XIII. ZONING ORDINANCES

There will be certain building restrictions in areas where structure elevation and/or flood proofing measures are proposed. The NFS will be required to publicize floodplain information for project area and will be required to provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with risk reduction levels provided by the Project. Additionally, the NFS will be required to prevent obstructions or encroachments on the Project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on *Project* lands, easements, and rights-of-way or the addition of facilities which might reduce the level of risk reduction of the Project. Additionally, local Parish building code enforcement agencies would ensure compliance with the purpose and objectives of the Localized Storm Surge Risk Reduction component of the Project by requiring compliance with the flood proofing covenants contained in Project Flood Proofing Agreements with regard to future construction of additions, modifications, repair and replacement of existing Project flood proofed structures.

XIV. ACQUISITION SCHEDULE

Structural Project Features – Acquisition Schedule

The following acquisition schedule is based on the premise that the Project will impact approximately 34 private landowners for the levee alignment. It is assumed that this portion of the Project will be constructed in sections. A detailed acquisition schedule will be refined during PED, once the 95% plans and specifications are prepared for each section of the project. The schedule will begin once a Right of Entry request has been received by Real Estate. The schedule below provides the total amount of time to complete the acquisition of real estate rights for mitigation and for the construction of the levee alignment and other Project features. It is possible that some of the tasks listed below could be concurrent. For the purposes of this Report, these tasks are presented as being consecutively performed (with the exception of closings and condemnations), and the durations below represent the approximate total time of acquisition.

1)	TOD, Mapping	3 months
2)	Obtain Title & Appraisals	6 months
3)	Negotiations	2 years
4)	Closing	1 year
5)	Eminent Domain Proceedings	6 years

Localized Storm Surge Risk Reduction Project Features – Acquisition Schedule

The following schedule is based on the premise that the Localized Storm Surge Risk Reduction Project features (excluding flood proofing measures) will affect approximately 108 private landowners.

It is assumed that the Localized Storm Surge Risk Reduction features will be constructed in sections. A detailed acquisition schedule will be refined during PED, once the 95% plans and specifications are prepared for each section of the Project. The schedule will begin once a Right of Entry request has been received by Real Estate. The schedule below provides the total amount of time to complete the acquisition of real estate rights for construction of the Localized Storm Surge Risk Reduction Project features. It is possible that some of the tasks listed below could be concurrent. For the purposes of this Report, these tasks are presented as being consecutively implemented (with the exception of closings and condemnations), and the durations below represent the approximate total time of acquisition.

1)	TOD, Mapping	2 years
2)	Obtain Title & Appraisals	2 years
3)	Negotiations	4 years
4)	Closing	2 years
5)	Eminent Domain Proceedings	6 years

Localized Storm Surge Risk Reduction (Structure Elevation and Flood Proofing Measures) – Acquisition Schedule

There will be an acquisition of an interest in real estate contained within the flood proofing agreements for the flood proofing measures proposed to address individual residential and non-residential structures. This interest in real estate will represent a covenant running with the land. An Agreement will be executed between the NFS and approximately 23 landowners and will be recorded in the Conveyance Records of the Parish in which the structure is located. The following schedule represents the estimated duration of tasks relating to construction of the elevations/commercial flood proofing measures:

Applications for structure elevation or commercial flood proofing	3 months
Title research	3 months
Appraisals	3 months
HTRW Site Inspections	3 months
Landowner/Contractor Negotiations	6 months
Negotiation of Flood Proofing Agreement	6 months
Execution of Flood Proofing Agreement	2 months
Filing Flood Proofing Agreement	2 months

XV. FACILITY/UTILITY RELOCATIONS

Relocation data is collected and detailed by the USACE New Orleans District, Engineering Division, Design Services Branch Relocations Team. There are an estimated 36 pipelines that will require relocation in the implementation of the recommended plan. These pipelines will be relocated within existing Right-of-Way or levee Right-of-Way. A preliminary list of pipeline relocations is included as Table 3 below (for reference, map of relocations is located in Annex E). "ANY CONCLUSION OR CATEGORIZATION CONTAINED IN THIS REPORT THAT AN ITEM IS A UTILITY OR FACILITY RELOCATION TO BE PERFORMED BY THE NON-FEDERAL SPONSOR AS PART OF ITS LERRD RESPONSIBILITIES IS PRELIMINARY ONLY. THE GOVERNMENT WILL MAKE A FINAL DETERMINATION OF THE RELOCATIONS NECESSARY FOR THE CONSTRUCTION, OPERATION, OR MAINTENANCE OF THE PROJECT AFTER FURTHER ANALYSIS AND COMPLETION AND APPROVAL OF FINAL ATTORNEY'S OPINIONS OF COMPENSABILITY FOR EACH OF THE IMPACTED UTILITIES AND FACILITIES."

The estimated cost of pipeline relocations is $19,198,000. These costs are 100% borne by the Non-Federal Sponsor. Real Estate Guidance issued for 3x3x3 studies indicates that if the costs of relocation of facilities and utilities is less than 30% of project costs, a preliminary compensable interest report need not be prepared. Because the estimated cost of relocations does not exceed 30% of total project cost, an Attorney's Preliminary Opinion of Compensable Interest was not prepared for this project.

Table 3 below contains a list of the pipeline relocations and anticipated construction costs. These costs are reflected as relocations (02-Relocations) within the project cost certification. This information will be reviewed during PED, and a Final Attorney's Opinion of Compensability will be prepared prior to execution of the PPA. Until that opinion is prepared, the compensability of the facility/utility is unknown.

Table 3: Pipeline Relocations

West Shore Lake Pontchartrain, LA Hurricane Protection Project

Alignment C (Pipeline Avoidance) Pipeline Crossings
30% Contingency

COMPANY	PRODUCT	SIZE	MII COSTS
MARATHON ASHLAND PIPELINE LLC	CRUDE OIL	30"	$727,289
SHELL PIPELINE COMPANY	REFINED PRODUCTS LINE	24"	$696,083
	GAS	24"	$696,223
ST. JOHN THE BAPTIST PARISH POTABLE WATER	TRANSMISSION LINE	24"	$696,083
SHELL PIPELINE COMPANY LP	AREA WIDE MAINTENANCE	24"	$696,223
MARATHON ASHLAND PIPELINE LLC	PETROLEUM PRODUCT	20"	$636,218
WILPRISE PIPELINE COMPANY	PIPELINE	12.75"	$463,882
SOUTHERN STATES PIPELINE COMPANY	GAS	12.75"	$463,882
WILPRISE PIPELINE COMPANY	NATURAL GAS LIQUID	12"	$463,882
SHELL PIPELINE COMPANY LP	PIPELINE AREA WIDE MAINTENANCE	12"	$463,882
WILPRISE PIPELINE COMPANY	NATURAL GAS LIQUID	12"	$672,761
WILPRISE PIPELINE COMPANY	PIPELINE	12"	$672,761
AIR PRODUCTS	HYDROGEN DUPONT MAINLINE	12"	$672,761
GULF LIQUIDS NEW RIVER	PIPELINE	12"	$672,761
GULF INTERSTATE / BIG THREE INDUSTRIES	NITROGEN	12"	$672,761
GULF INTERSTATE / BIG THREE INDUSTRIES	OXYGEN	12"	$672,761
WILPRISE PIPELINE COMPANY	PIPELINE	12"	$672,761
GULF LIQUIDS NEW RIVER	PIPELINE	12"	$672,761
TEXACO PIPELINE LLC.	EXISTING PIPELINE MAINTENANCE	8"	$448,377
BRIDGELINE GAS DISTRIBUTION LLC	SURVEY LINE	8"	$448,377
ENTERPRISE PIPELINE COMPANY	PROPANE	8"	$448,377
SORRENTO PIPELINE COMPANY	PIPELINE	8"	$448,377
ENTERPRISE - WILPRISE	NGL PROPANE	6.629"	$433,219
BRIDGELINE GAS DISTRIBUTION LLC	BUTANE	6"	$433,219
WILPRISE PIPELINE COMPANY	PIPELINE MAINTENANCE - CLEAR ROW	6"	$433,219
WILPRISE PIPELINE COMPANY	PIPELINE MAINTENANCE - CLEAR ROW	6"	$433,219
BRIDGELINE GAS DISTRIBUTION LLC	BUTANE	6"	$433,219
NICOR EXPLORATION GAS	GAS	6"	$433,219
CHEVRON TEXACO	AREA WIDE FLOWLINE MAINTENANCE & REPAIR (SS01)	6"	$433,219
BRIDGELINE GAS DISTRIBUTION LLC	PROPANE	6"	$433,219
SHELL PIPELINE COMPANY LP	FLOWLINE INSPECT / REPAIR	6"	$433,219
ENTERPRISE PIPELINE COMPANY	LIQUIFIED PETROLEUM GASES (PROPANE)	6"	$433,219
LIG	GAS	4"	$421,624
SHELL OIL COMPANY	EPSILON ETHYLENE CONNECTION	4"	$421,624
SHELL PIPELINE COMPANY LP	EXISTING PIPELINE MAINTENANCE	4"	$421,624
I.P. PETROLEUM COMPANY	PIPELINE	4"	$421,624
		TOTAL	$19,197,927

A separate Relocations Report, containing relocations costs, will be submitted as a reference to the Engineering Appendix. Maps of potential relocations can be referenced in that appendix. Those relocation costs represent a preliminary level of design and will be further refined during the development of the project P&S.

The NFS will perform these relocations as a part of its responsibility under the project authority. The conclusions contained herein are preliminary only. The USACE will make a final determination of the relocations necessary for the construction, operation or maintenance of the project after further analysis, and completion and approval of the Final Attorney's Opinion of Compensability for each of the impacted utilities and facilities.

XVI. HAZARDOUS, TOXIC AND RADIOACTIVE WASTE (HTRW)

A Phase I Environmental Site Assessment was conducted in February, 2014. The assessment cautioned that oil and gas pipelines must be observed to avoid damaging any pipelines traversing the Project area, but found no leaks or other problems associated with these facilities. The assessment found that there is a low probability of encountering HTRW, and recommended no further investigation.

For the non-structural home elevations, an HTRW assessment will be performed on each individual structure prior to elevation. If the findings indicate that there are HTRW issues, the NFS and homeowner will be required to remediate prior to commencement of construction. The costs of remediation will not be a Federal responsibility, and will not be creditable to the NFS.

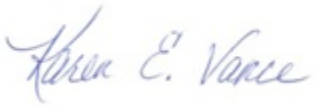
XVII. LANDOWNER CONCERNS

The overall Project has received support from the community; however, the attitudes of the landowners who will be directly affected by its construction is not known. Public comments have reflected dissatisfaction with the selection of Alignment C (and were more in favor of Alignment D), and have indicated that landowners in St. James Parish are dissatisfied with the recommendation of Localized Storm Surge Risk Reduction project features in that area. The NFS is confident that it will be able to acquire the LERRDS required for the project.

XVIII. NFS RISK NOTIFICATION

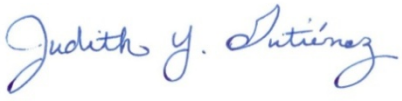
In accordance with the requirements of ER 405-1-12, Chapter 12, Real Estate Roles & Responsibilities for Civil Works: Cost Shared and Full Federal Projects, CPRAB has been notified in writing of the risks of acquiring LERRDs before execution of the PPA. A copy of the letter sent to the Sponsor is included in Annex F.

Prepared By:



Karen E. Vance
Realty Specialist, Planning & Appraisal Branch
Real Estate Region South Division
November 19, 2014

Recommended for Approval By:



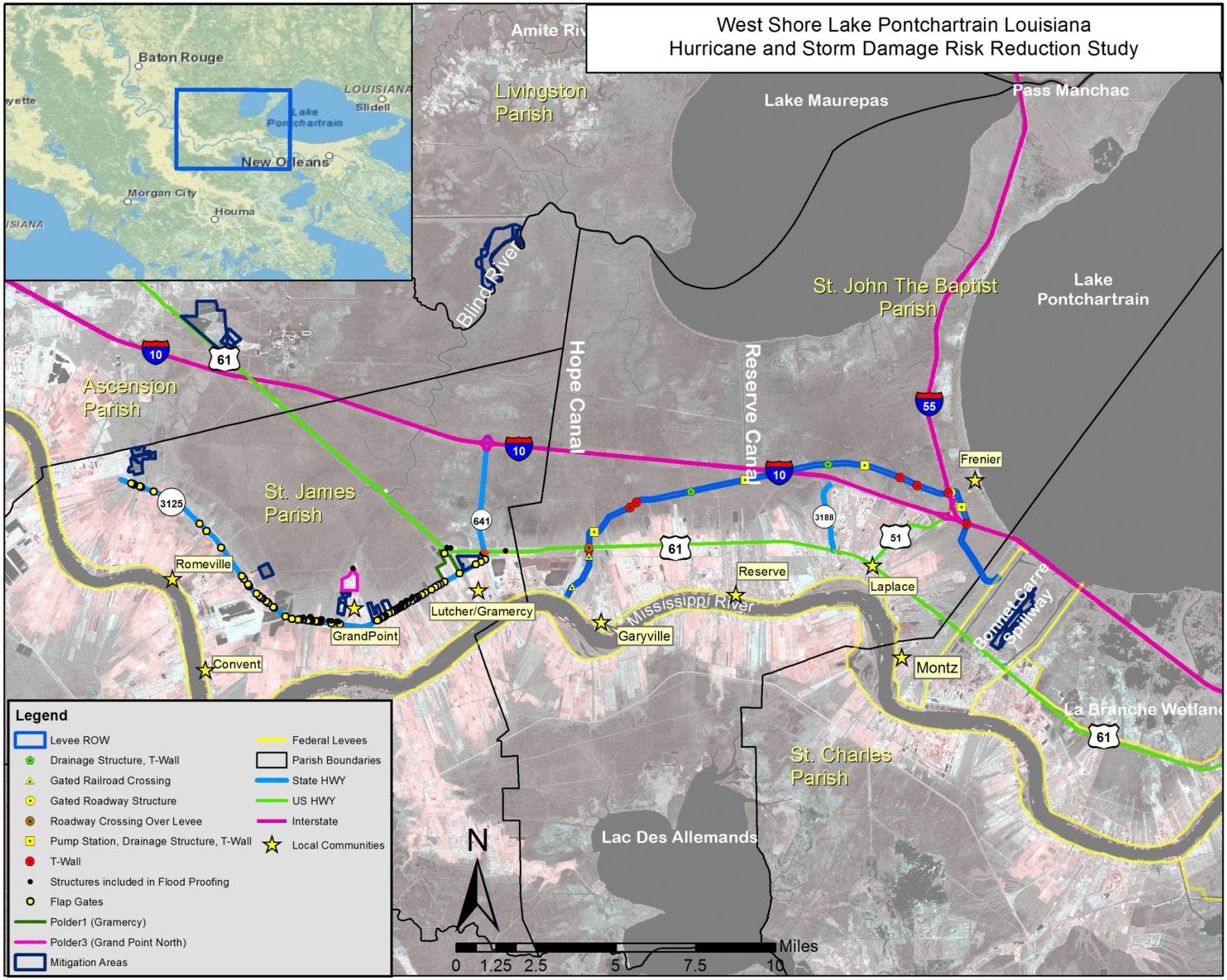
Judith Y. Gutierrez
Chief, Appraisal & Planning Branch
Real Estate Region South Division
November 19, 2014

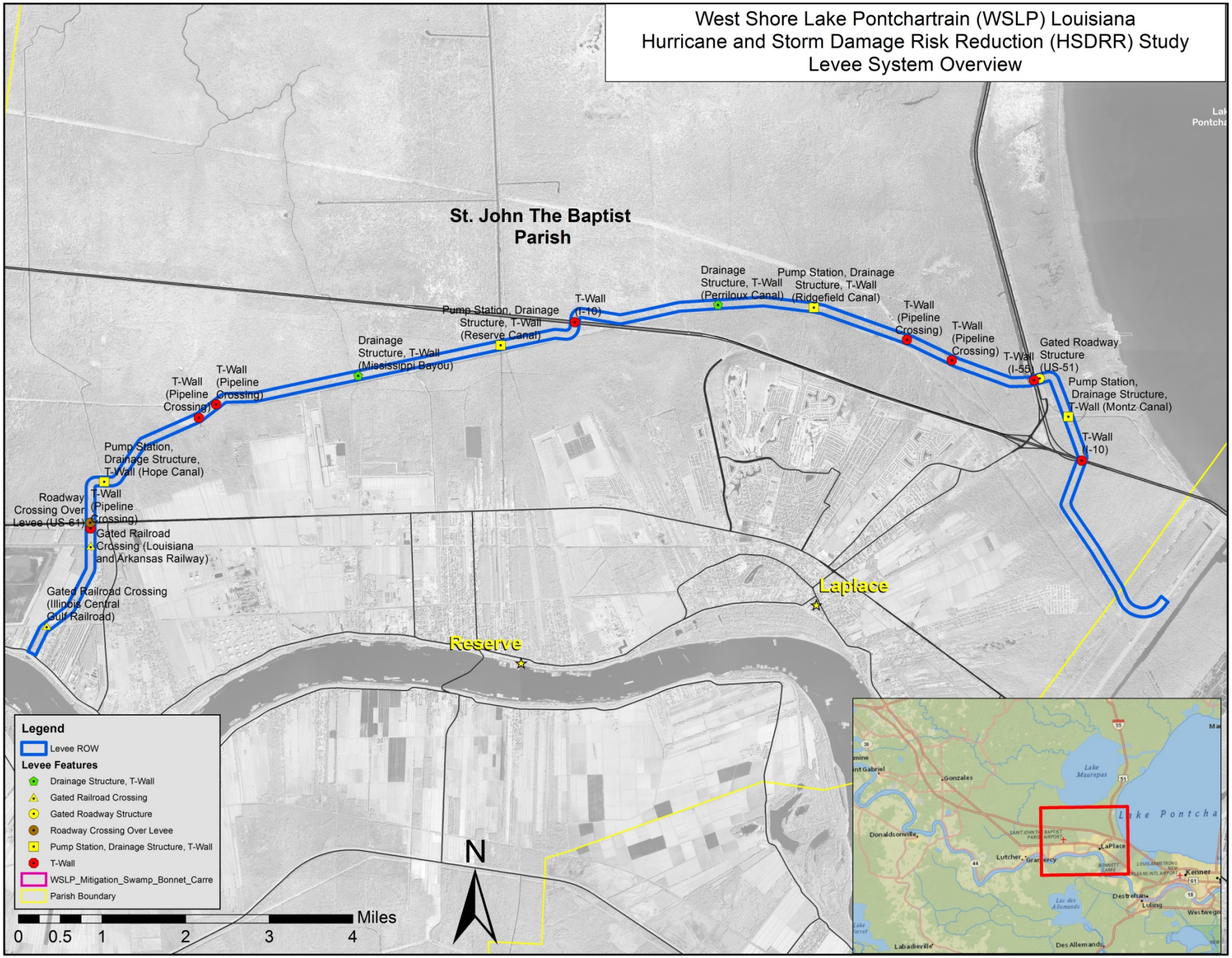
WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

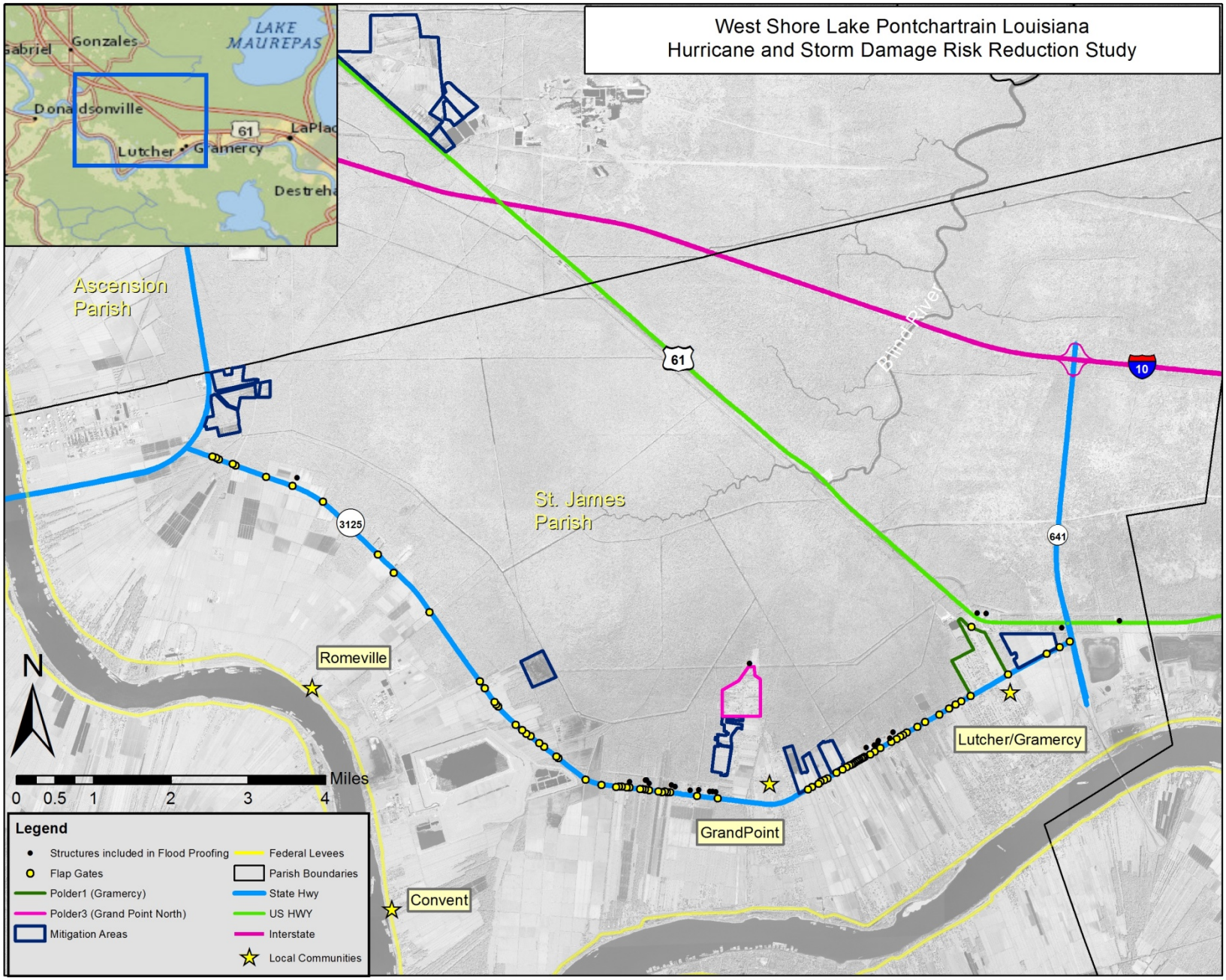
APPENDIX C

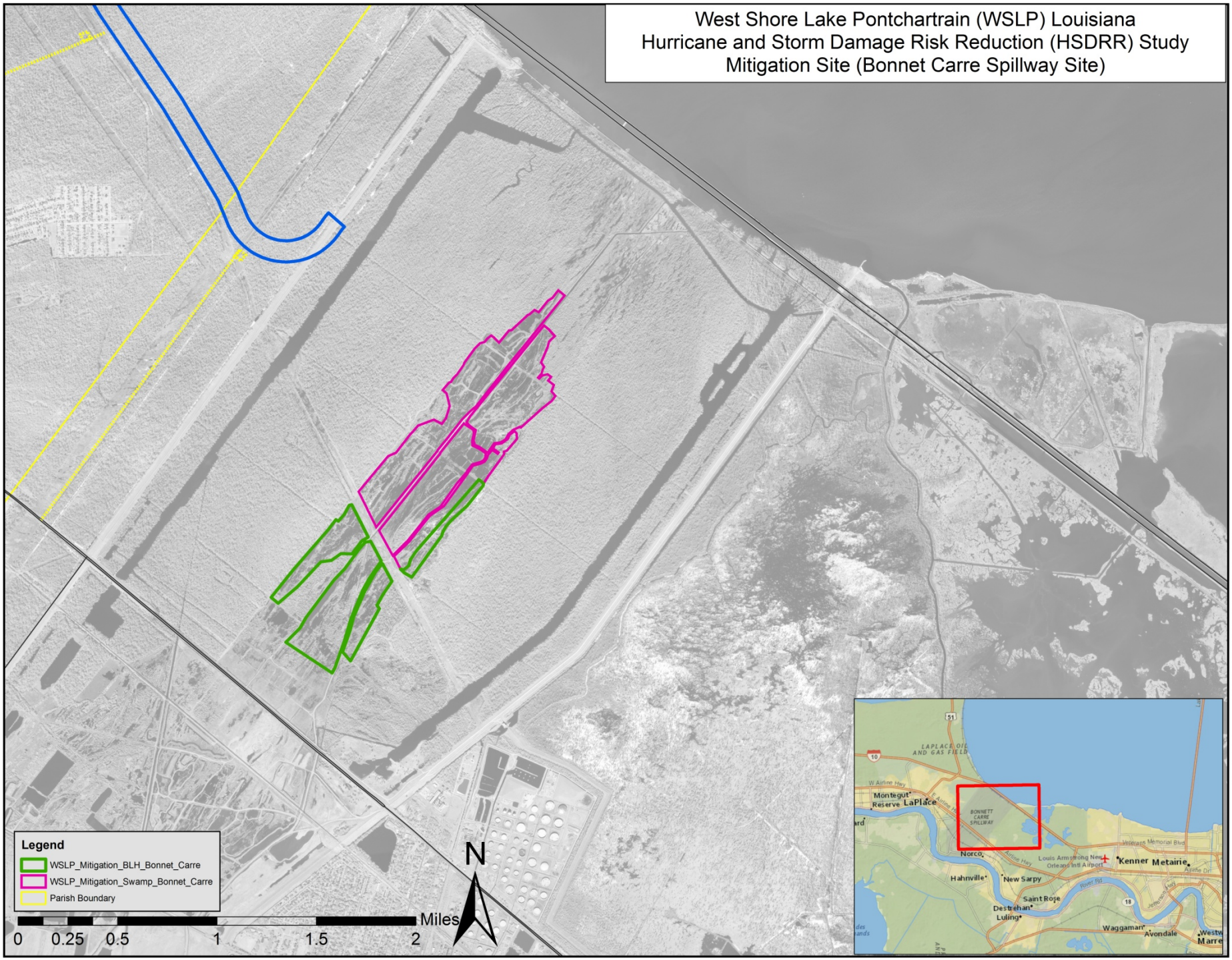
ANNEX A

PROJECT MAPS

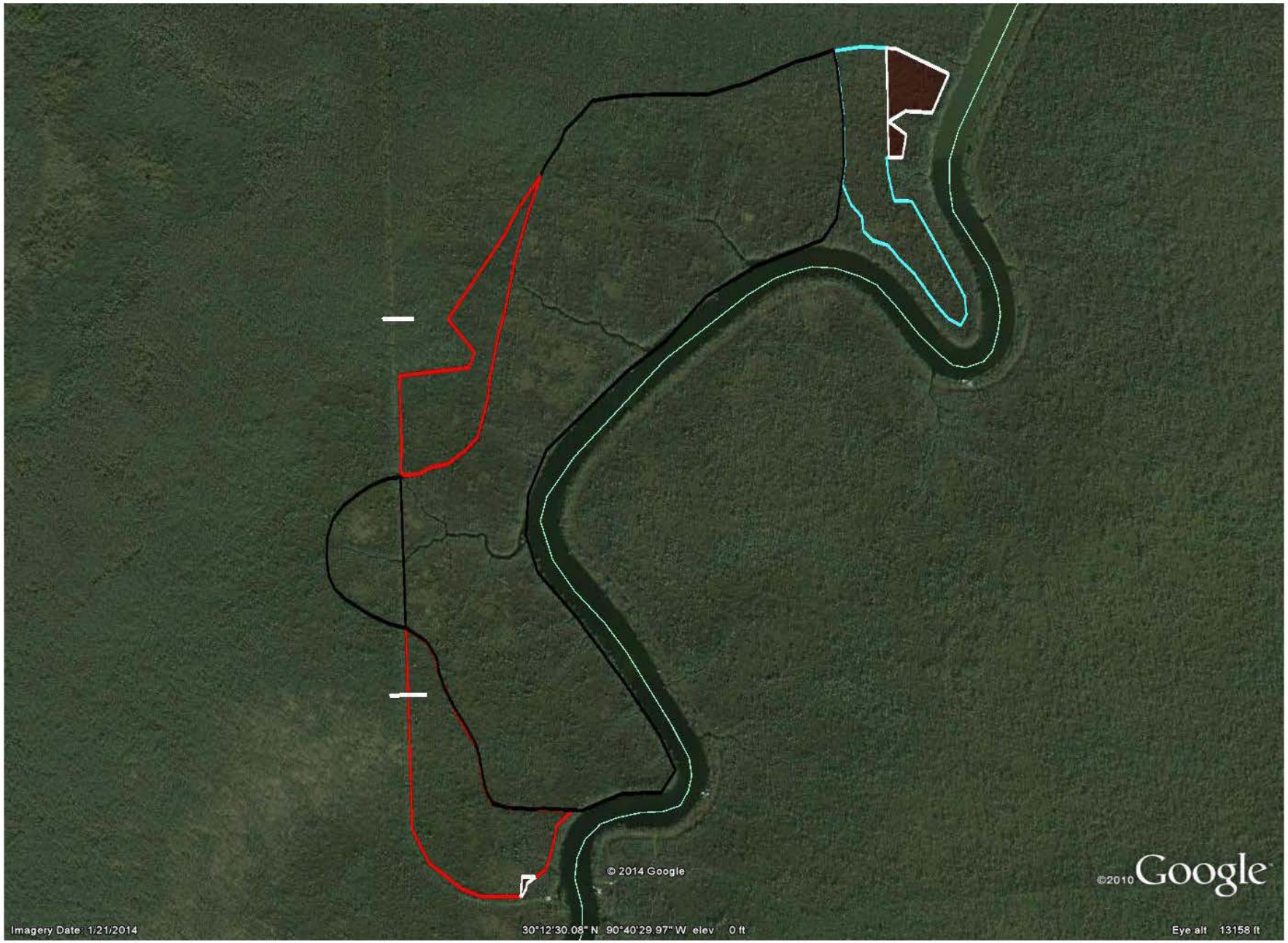

West Shore Lake Pontchartrain Louisiana
Hurricane and Storm Damage Risk Reduction Study
Baton Rouge
LOUISIANA
Slidell
Lake Pontchartrain
New Orleans
Morgan City
Houma
Livingston Parish
Lake Maurepas
Pass Manchac
Blind River
Hope Canal
Reserve Canal
St. John The Baptist Parish
Lake Pontchartrain
Ascension Parish
St. James Parish
10
61
55
3125
641
3188
51
Frenier
Romeville
Lutcher/Gramercy
GrandPoint
Convent
Reserve
Laplace
Mississippi River
Garyville
Montz
Bonnet Carre Spillway
St. Charles Parish
Lac Des Allemands
N
Miles
0 1.25 2.5 5 7.5 10
Legend
Levee ROW
Drainage Structure, T-Wall
Gated Railroad Crossing
Gated Roadway Structure
Roadway Crossing Over Levee
Pump Station, Drainage Structure, T-Wall
T-Wall
Structures included in Flood Proofing
Flap Gates
Polder1 (Gramercy)
Polder3 (Grand Point North)
Mitigation Areas
Federal Levees
Parish Boundaries
State HWY
US HWY
Interstate
Local Communities


West Shore Lake Pontchartrain (WSLP) Louisiana
Hurricane and Storm Damage Risk Reduction (HSDRR) Study
Levee System Overview
St. John The Baptist Parish
Drainage Structure, T-Wall (Perriloux Canal)
Pump Station, Drainage Structure, T-Wall (Ridgefield Canal)
T-Wall (Pipeline Crossing)
T-Wall (Pipeline Crossing)
T-Wall (I-55)
Gated Roadway Structure (US-51)
Pump Station, Drainage Structure, T-Wall (Montz Canal)
T-Wall (I-10)
T-Wall (I-10)
Pump Station, Drainage Structure, T-Wall (Reserve Canal)
Drainage Structure, T-Wall (Mississippi Bayou)
T-Wall (Pipeline Crossing)
T-Wall (Pipeline Crossing)
Pump Station, Drainage Structure, T-Wall (Hope Canal)
Roadway Crossing Over Levee (US-61)
T-Wall (Pipeline Crossing)
Gated Railroad Crossing (Louisiana and Arkansas Railway)
Gated Railroad Crossing (Illinois Central Gulf Railroad)
Laplace
Reserve
Legend
Levee ROW
Levee Features
Drainage Structure, T-Wall
Gated Railroad Crossing
Gated Roadway Structure
Roadway Crossing Over Levee
Pump Station, Drainage Structure, T-Wall
T-Wall
WSLP_Mitigation_Swamp_Bonnet_Carre
Parish Boundary
N
0 0.5 1 2 3 4
Miles

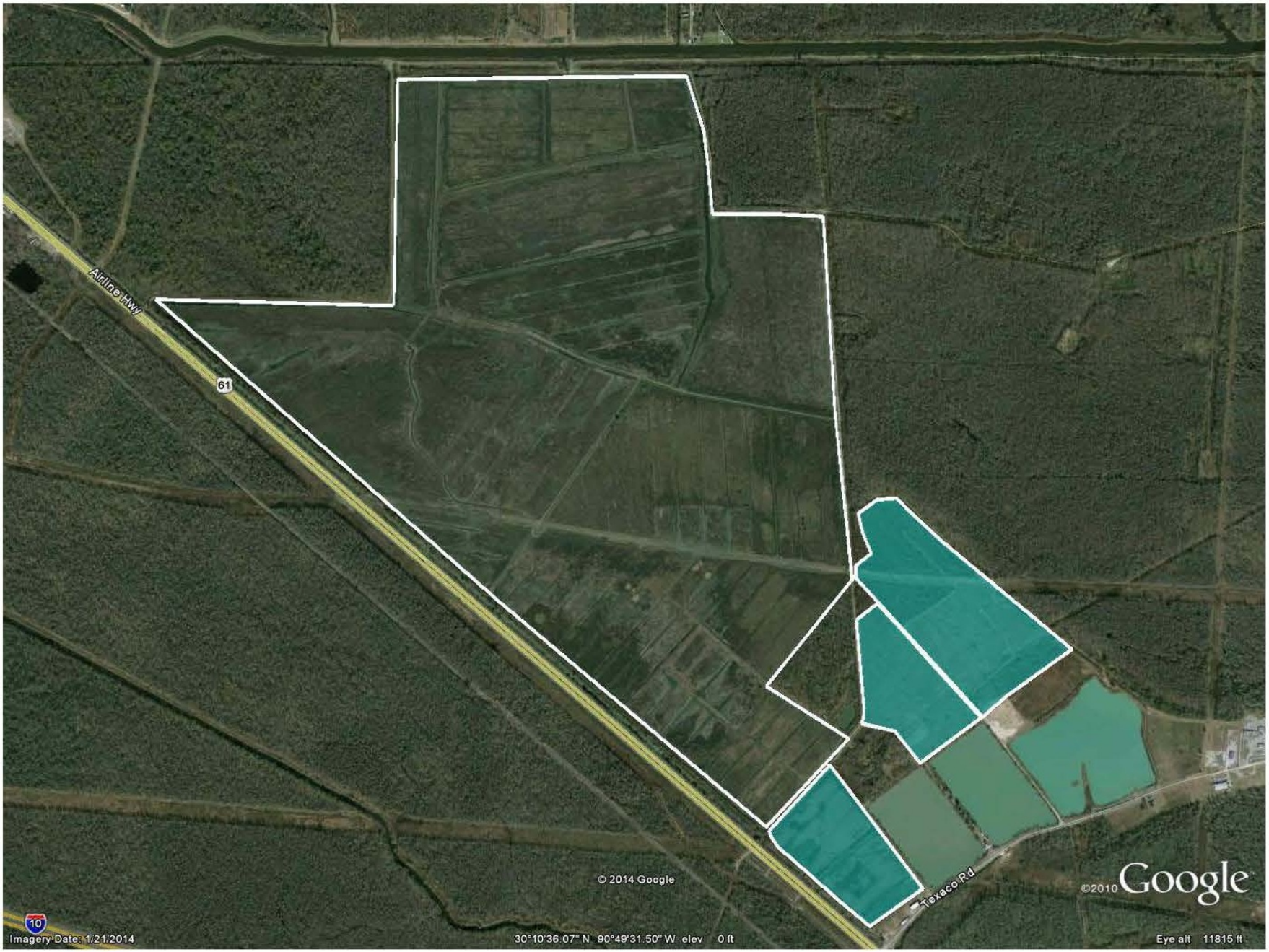

West Shore Lake Pontchartrain Louisiana
Hurricane and Storm Damage Risk Reduction Study
LAKE MAUREPAS
Gonzales
Donaldsonville
Lutcher
Gramercy
61
Ascension Parish
St. James Parish
Blind River
10
641
3125
Romeville
GrandPoint
Lutcher/Gramercy
Convent
N
Miles
0 0.5 1 2 3 4
Legend
Structures included in Flood Proofing
Flap Gates
Polder1 (Gramercy)
Polder3 (Grand Point North)
Mitigation Areas
Federal Levees
Parish Boundaries
State Hwy
US HWY
Interstate
Local Communities


West Shore Lake Pontchartrain (WSLP) Louisiana
Hurricane and Storm Damage Risk Reduction (HSDRR) Study
Mitigation Site (Bonnet Carre Spillway Site)
Legend
WSLP_Mitigation_BLH_Bonnet_Carre
WSLP_Mitigation_Swamp_Bonnet_Carre
Parish Boundary
N
0 0.25 0.5 1 1.5 2
Miles
LAPLACE OIL AND GAS FIELD
Montegut
Reserve
LaPlace
BONNETT CARRE SPILLWAY
Norco
Kenner
Metairie
Hahnville
New Sarpy
Saint Rose
Destrehan
Luling
Waggaman
Avondale

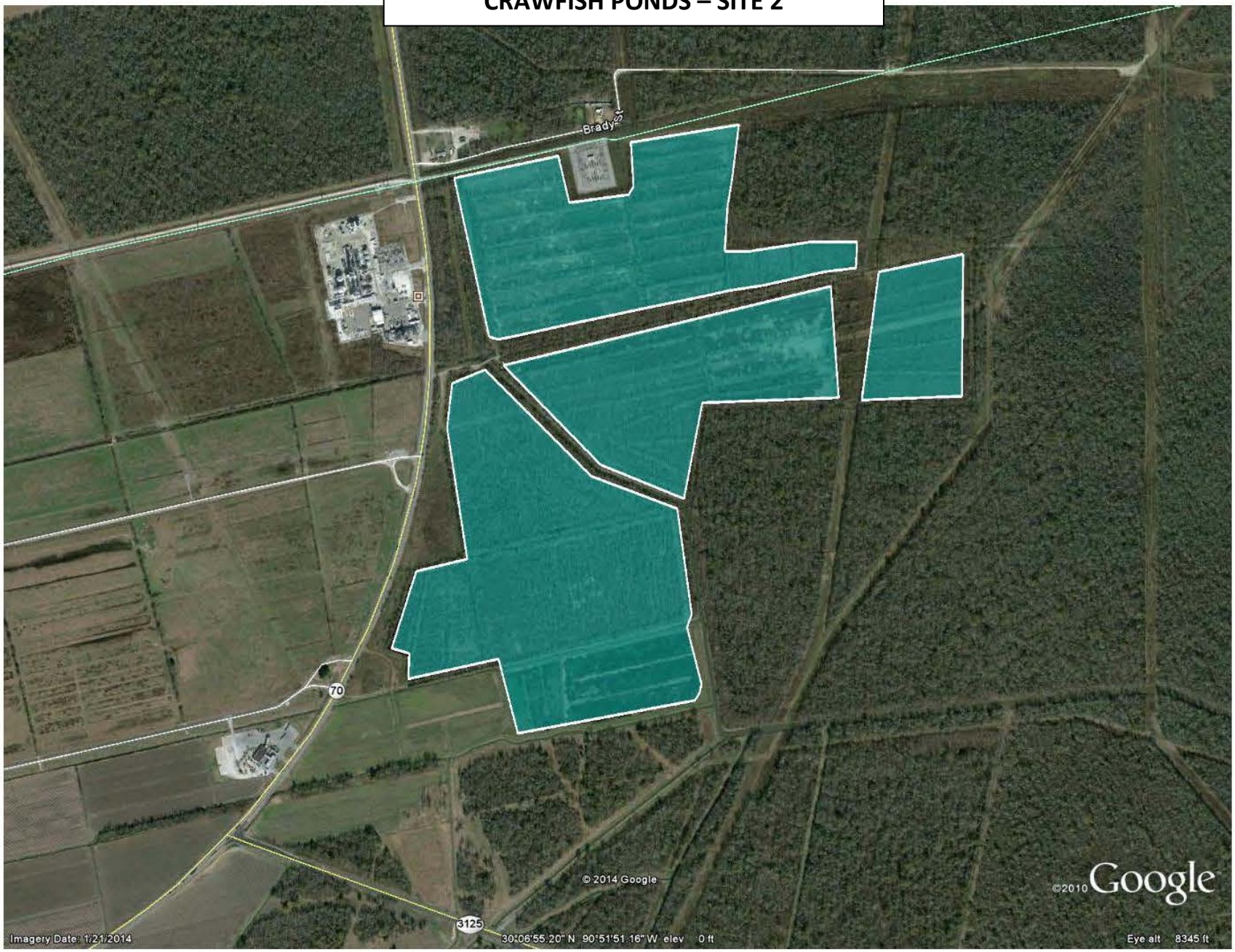
BLIND RIVER MITIGATION



MAUREPAS SWAMP MITIGATION FROM CRAWFISH PONDS – SITE 1

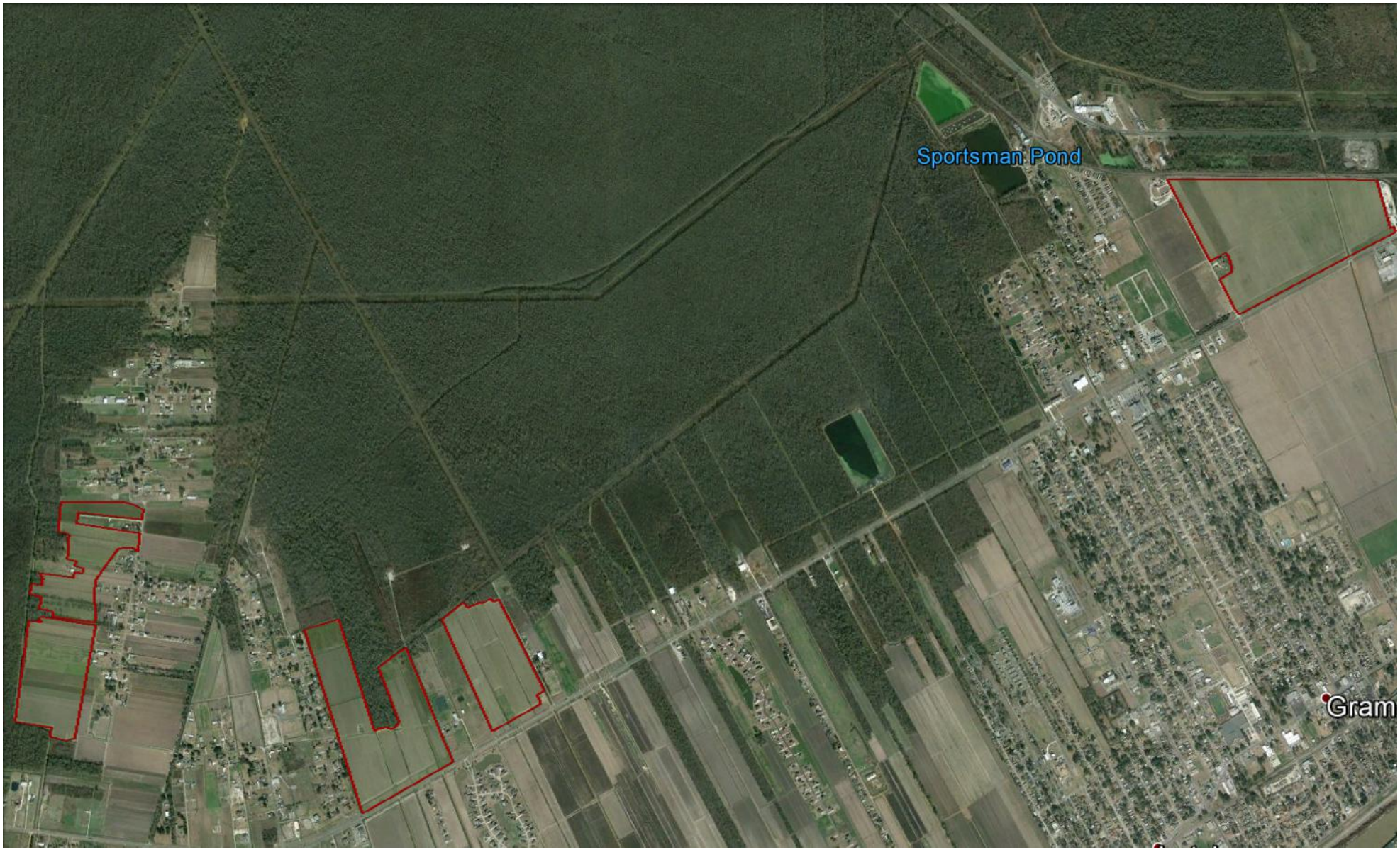


MAUREPAS SWAMP MITIGATION FROM CRAWFISH PONDS – SITE 2



MAUREPAS SWAMP MITIGATION FROM CRAWFISH PONDS – SITE 3

LUTCHER POLDER FARMLAND



WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX C

ANNEX B

ASSESSMENT OF NON-FEDERAL SPONSOR'S

ACQUISITION CAPABILITY

ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE ACQUISITION CAPABILITY

COASTAL PROTECTION AND RESTORATION AUTHORITY ("CPRA"), IMPLEMENTATION ARM OF THE COASTAL PROTECTION AND RESTROATION AUTHORITY BOARD ("BOARD")

I. Legal Authority:

a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes? **NO, however, CPRA, the implementation and enforcement arm of the Board, has the ability to acquire, own, administer, alienate, and otherwise dispose of all kinds of property, movable and immovable, corporeal and incorporeal for projects authorized by the CPRA Board. (RS 49:214.6.2)**

b. Does the sponsor have the power of eminent domain for this project?
YES. Through CPRA, the implementation arm of the Board, the Sponsor does have conventional eminent domain authority under RS 49:214.6.2(D)(2) and RS 19:2.

c. Does the sponsor have "quick-take" authority for this project?
NO. CPRA, the implementation and enforcement arm of the Board, does not have quick take authority however, should this be needed for the project, CPRA or the CPRA Board may partner with a Levee District or Parish Government which has that authority pursuant to La. R.S. 38:301.1, La. R.S. 49:214.5.2(7) and (11) , and 49:214.6.2(D)(1) and (2), pursuant to an intergovernmental agreement.

d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary? **NO**

e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? **Unknown at this time however, there are rail roads located in the vicinity of the project.**

II. Human Resource Requirements:

a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of Federal projects including P.L. 91-646, as amended? **NO**

b. If the answer to II.a. is "yes," has a reasonable plan been developed to provide such training? **N/A**

c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? **YES**

d. Is the sponsor's projected in-house staffing level sufficient considering its other workload, if any, and the project schedule? **Not at this time. However, CPRA has numerous contracts in place**

e. Can the sponsor obtain contractor support, if required in a timely fashion? **YES, contracts are in place now.**

f. Will the sponsor likely request USACE assistance in acquiring real estate? **It is not likely that the Sponsor will request assistance.**

III. Other Project Variables:

a. Will the sponsor's staff be located within reasonable proximity to the project site? **YES**

b. Has the sponsor approved the project/real estate schedule/milestones? **At the feasibility level, there are too many unknowns to develop a definite project schedule. Once project designs are finalized, the CPRA will be requested to provide an acquisition schedule.**

IV. Overall Assessment:

a. Has the sponsor performed satisfactorily on other USACE projects? **YES**

b. With regard to this project, the sponsor is anticipated to be: highly capable/fully capable/moderately capable/marginally capable/insufficiently capable. **Highly capable.**

V. Coordination:

a. Has this assessment been coordinated with the sponsor? **YES**

b. Does the sponsor concur with this assessment? **YES**

Prepared by:	Approved by:	Approved by:
Karen Vance	James L. Altman	
Karen E. Vance Realty Specialist Appraisal & Planning Branch Real Estate Region South Division USACE	James L. Altman Land Manager Legal/Real Estate Division Coastal Protection & Restoration Authority	Jerome Zeringue Chairman Coastal Protection & Restoration Authority Board
6/16/14 Date	6-17-14 Date	6-19-2014 Date

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX C

ANNEX C

NON-MATERIAL DEVIATION FROM

STANDARD ESTATE

TEMPORARY ACCESS EASEMENT

&

PERPETUAL ACCESS EASEMENT

TEMPORARY ACCESS EASEMENT

A non-exclusive and assignable temporary easement for a period not to exceed _____years beginning with date possession of the land is granted to the Coastal Protection and Restoration Authority Board (CPRAB), for use by the CPRAB, its representatives, agents, and contractors as an access route and/or right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. _____, _____ and _____); together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way, reserving, however, to the owners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired, including the right to cross over the right-of-way as access to their adjoining land; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

In accordance with paragraph 12-9 c. of ER 405-1-12, the District Chief of Real Estate may approve a non-standard estate if it serves the intended project purpose, substantially conforms with and does not materially deviate from a corresponding standard estate, and does not increase the costs or potential liability of the Government. The foregoing estate complies with those requirements as it achieves the project purpose in as narrow a manner as practical, and is a minor modification of the standard Road Easement, adding language for a temporary term and replacing the word "road" with the words "access route" and/or "right of way".

Reviewed by:

Marco Rosamano
Assistant District Counsel
New Orleans District

Approved by:

Linda Labure
Chief, Real Estate Division
New Orleans District

PERPETUAL ACCESS EASEMENT

A perpetual non-exclusive and assignable easement for use by the Coastal Protection and Restoration Authority Board (CPRAB), for use by the CPRAB, its representatives, agents, and contractors as an access route and/or right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. _____, _____ and _____); together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way, reserving, however, to the owners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired, including the right to cross over the right-of-way as access to their adjoining land; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

In accordance with paragraph 12-9 c. of ER 405-1-12, the District Chief of Real Estate may approve a non-standard estate if it serves the intended project purpose, substantially conforms with and does not materially deviate from a corresponding standard estate, and does not increase the costs or potential liability of the Government. The foregoing estate complies with those requirements as it achieves the project purpose in as narrow a manner as practical, and is a minor modification of the standard Road Easement, adding language for a perpetual term and replacing the word "road" with the words "access route" and/or "right of way".

Reviewed by:

Marco Rosamano
Assistant District Counsel
New Orleans District

Approved by:

Linda Labure
Chief, Real Estate Division
New Orleans District

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX C

ANNEX D

NON-MATERIAL DEVIATION FROM

STANDARD ESTATE

FLOOD PROTECTION BERM EASEMENT

FLOOD PROTECTION BERM EASEMENT

A perpetual and assignable right and easement in (the land described in Schedule A) (Tracts Nos, ____, ____ and ____) to construct, maintain, repair, operate, patrol and replace a flood protection berm, including all appurtenances thereto; reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

In accordance with paragraph 12-9 c. of ER 405-1-12, the District Chief of Real Estate may approve a non-standard estate if it serves the intended project purpose, substantially conforms with and does not materially deviate from a corresponding standard estate, and does not increase the costs or potential liability of the Government. The foregoing estate complies with those requirements as it achieves the project purpose in as narrow a manner as practical, and is a minor modification of the standard Flood Protection Levee Easement, replacing the words "levee, floodwall, gate closure, sandbag closure" with the word "berm".

Approved by:

Linda C. Labure
New Orleans District, Chief
Real Estate Region South Division

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX C

ANNEX E

FACILITY/UTILITY RELOCATIONS

UG
UG
SORRENTO PIPELINE COMPANY
ST CHARLES PARISH COUNCIL
EQUILON PIPELINE COMPANY LLC
ST JOHN THE BAPTIST PARISH
TEXACO PIPELINES LLC
CHARLES DEPT OF W
LS QC
SHELL PIPELINE COMPANY LP
SOUTHERN STATES PIPELINE CORP
SORRENTO PIPELINE COMPANY
CONCHA CHEMICAL PIPELINE COMPANY
WILLIAMS PIPELINE CO
I.P. PETROLEUM CO
UNITEDGAS
CONOCO
SHELL OIL COMPANY
SHELL PIPELINE COMPANY LP
SHELL PIPELINE CO
SHELL PIPELINE CO
SHELL LIQUIDS NEW RIVER
WILLIAMS PIPELINE CO
SHELL PIPELINE COMPANY LP
WILLIAMS PIPELINE CO
BRIDGELINE GAS DISTR
AIR PRODUCTS
MARATHON
ST JOHN PARISH
ST JOHN PARISH
SHELL PIPELINE COMPANY LLC
WILLIAMS PIPELINE COMPANY LLC

West Shore Lake Pontchartrain, LA Hurricane Protection Project

Alignment C (Pipeline Avoidance) Pipeline Crossings
30% Contingency

COMPANY	PRODUCT	SIZE	MII COSTS
MARATHON ASHLAND PIPELINE LLC	CRUDE OIL	30"	$727,289
SHELL PIPELINE COMPANY	REFINED PRODUCTS LINE	24"	$696,083
	GAS	24"	$696,223
ST. JOHN THE BAPTIST PARISH POTABLE WATER	TRANSMISSION LINE	24"	$696,083
SHELL PIPELINE COMPANY LP	AREA WIDE MAINTENANCE	24"	$696,223
MARATHON ASHLAND PIPELINE LLC	PETROLEUM PRODUCT	20"	$636,218
WILPRISE PIPELINE COMPANY	PIPELINE	12.75"	$463,882
SOUTHERN STATES PIPELINE COMPANY	GAS	12.75"	$463,882
WILPRISE PIPELINE COMPANY	NATURAL GAS LIQUID	12"	$463,882
SHELL PIPELINE COMPANY LP	PIPELINE AREA WIDE MAINTENANCE	12"	$463,882
WILPRISE PIPELINE COMPANY	NATURAL GAS LIQUID	12"	$672,761
WILPRISE PIPELINE COMPANY	PIPELINE	12"	$672,761
AIR PRODUCTS	HYDROGEN DUPONT MAINLINE	12"	$672,761
GULF LIQUIDS NEW RIVER	PIPELINE	12"	$672,761
GULF INTERSTATE / BIG THREE INDUSTRIES	NITROGEN	12"	$672,761
GULF INTERSTATE / BIG THREE INDUSTRIES	OXYGEN	12"	$672,761
WILPRISE PIPELINE COMPANY	PIPELINE	12"	$672,761
GULF LIQUIDS NEW RIVER	PIPELINE	12"	$672,761
TEXACO PIPELINE LLC.	EXISTING PIPELINE MAINTENANCE	8"	$448,377
BRIDGELINE GAS DISTRIBUTION LLC	SURVEY LINE	8"	$448,377
ENTERPRISE PIPELINE COMPANY	PROPANE	8"	$448,377
SORRENTO PIPELINE COMPANY	PIPELINE	8"	$448,377
ENTERPRISE - WILPRISE	NGL PROPANE	6.629"	$433,219
BRIDGELINE GAS DISTRIBUTION LLC	BUTANE	6"	$433,219
WILPRISE PIPELINE COMPANY	PIPELINE MAINTENANCE - CLEAR ROW	6"	$433,219
WILPRISE PIPELINE COMPANY	PIPELINE MAINTENANCE - CLEAR ROW	6"	$433,219
BRIDGELINE GAS DISTRIBUTION LLC	BUTANE	6"	$433,219
NICOR EXPLORATION GAS	GAS	6"	$433,219
CHEVRON TEXACO	AREA WIDE FLOWLINE MAINTENANCE & REPAIR (SS01)	6"	$433,219
BRIDGELINE GAS DISTRIBUTION LLC	PROPANE	6"	$433,219
SHELL PIPELINE COMPANY LP	FLOWLINE INSPECT / REPAIR	6"	$433,219
ENTERPRISE PIPELINE COMPANY	LIQUIFIED PETROLEUM GASES (PROPANE)	6"	$433,219
LIG	GAS	4"	$421,624
SHELL OIL COMPANY	EPSILON ETHYLENE CONNECTION	4"	$421,624
SHELL PIPELINE COMPANY LP	EXISTING PIPELINE MAINTENANCE	4"	$421,624
I.P. PETROLEUM COMPANY	PIPELINE	4"	$421,624
		TOTAL	$19,197,927

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX C

ANNEX F

RISK LETTER

DEPARTMENT OF THE ARMY
REAL ESTATE REGION SOUTH DIVISION, CORPS OF ENGINEERS
NEW ORLEANS DISTRICT REAL ESTATE OFFICE
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

Real Estate Division
Appraisal & Planning Branch

Mr. Jerome Zeringue, Chairman
Coastal Protection and Restoration
Authority Board
P. O. Box 44027
Baton Rouge, LA 70804-4027

Dear Mr. Zeringue:

As you are aware, the West Shore Lake Pontchartrain Hurricane Storm Damage Risk Reduction Study is near complete. The Final Integrated Feasibility Report is scheduled to be complete in December 2014. The report contains preliminary right-of-way maps, which may change once the detail design of the project is completed. For this reason, in accordance with Corps of Engineers Regulation 405-1-12, Chapter 12, dated May 1, 1998, we are hereby formally advising you of the risks associated with acquisition of real estate rights prior to signing of the Project Partnership Agreement (PPA) and receiving a request from our agency for right of entry for construction.

Should you decide to proceed with acquisition of realty interests needed for construction of the subject project prior to our request for such efforts, you will assume full and sole responsibility for any and all costs, responsibility, or liability arising out of such efforts. Generally, these risks include, but may not be limited to the following:

a. The CPRAB may acquire interests or estates that are later determined by the Government to be inappropriate for the project, thus incurring costs, which may not be creditable under the provisions of Public Law 99-662.

b. The CPRAB may incur liability and expense by virtue of its ownership of contaminated lands, or interests therein, whether such liability should arise out of local, state, or Federal laws or regulations, including liability arising out of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended.

c. The CPRAB may initially acquire insufficient or excessive real property acreage which may result in additional negotiations and/or benefit payments under Public Law 91-646, as amended, as well as the payment of additional fair market value to affected landowners which could have been avoided by delaying acquisition until after the report

is approved for any land, easements, and rights-of-way, and the performance of relocations and disposals (LERRD).

d. The CPRAB may incur costs or expenses in connection with its decision to acquire LERRD in advance of the executed PPA and the Government's Notice to Proceed, which may not be creditable under the provisions of Public Law 99-662, or the PPA.

However, should you decide to proceed with acquisition of real estate interests, you are hereby notified that acquisition activities must conform to Public Law 91-646, The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. The Uniform Act describes the rights of landowners impacted by a federally funded project and the responsibilities of government agencies performing acquisition of real estate interests for such projects. Furthermore, in order to ensure that you receive the maximum possible credit once the project alignment is finalized, we suggest that you send for our review the résumé and proposed fees of your intended contractors as well as the following real estate products once completed: ownership plat and legal descriptions, appraisal reports, title reports, proposed negotiated settlements, and relocations assistance payments, if applicable.

If you have questions regarding the acquisition and crediting process, please call Judith Gutierrez, Chief Appraiser at (504) 862-2575 or Todd Klock, Chief, Local Sponsor Acquisition Branch at (504) 862-1920.

Sincerely,

for Judith Gutierrez

Linda C. LaBure
District Chief of Real Estate, New Orleans
Real Estate Region South Division
Real Estate Contracting Officer

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

Economic Appendix
APPENDIX D

Annex A: Reach Map
!yýŜÈ .Ý h{9 !ŁJŁJŜyŘŔÈ

West Shore Lake Pontchartrain LA Hurricane and Storm Surge Risk Reduction Feasibility Study
Economic Appendix

PART 1: BACKGROUND INFORMATION 3
INTRODUCTION 3
General 3
NED Benefit Categories Considered 3
DESCRIPTION OF THE STUDY AREA 4
Geographic Location 4
Land Use 4
SOCIOECONOMIC SETTING 5
Population and Number of Households 5
Income 5
Employment 6
Compliance with Policy Guidance Letter (PGL) 25 and Executive Order 11988 6
RECENT FLOOD HISTORY 6
Tropical Flood Events 6
FEMA Flood Claims 9
SCOPE OF THE STUDY 10
Problem Description 10
Project Alternatives 10
PART 2: ECONOMIC AND ENGINEERING INPUTS TO THE HEC-FDA MODEL 11
HEC-FDA MODEL 11
Model Overview 11
ECONOMIC INPUTS TO THE HEC-FDA MODEL 11
Structure Inventory 11
Future Development Inventory 12
Residential and Non-Residential Content-to-Structure Value Ratios 12
Vehicle Inventory 13
First Floor Elevations and Elevation of Vehicles 13

Depth-Damage Relationships 13
Uncertainty Surrounding the Economic Inputs 14
ENGINEERING INPUTS TO THE HEC-FDA MODEL 16
Ground Elevations 16
Stage-Probability Relationships 16
Uncertainty Surrounding the Engineering Inputs 16
PART 3: NATIONAL ECONOMIC DEVELOPMENT (NED) FLOOD DAMAGE AND BENEFIT CALCULATIONS 17
HEC-FDA Model Calculations 17
Stage-Damage Relationships with Uncertainty 17
Stage-Probability Relationships with Uncertainty 17
Without-Project Expected Annual Damages 18
Equivalent Annual Damages 18
PART 4: PROJECT COSTS OF THE RECOMMENDED PLAN 19
Construction 19
Average Annual Costs 19
PART 5: RESULTS OF THE ECONOMIC ANALYSIS 20
NET BENEFIT ANALYSIS 20
Calculation of Net Benefits 20
Net Benefits for the Flood Risk Management Project Components including Levee Alignment Alternative C and all Localized Storm Surge Risk Reduction Measures 20
Net Benefits for the Recommended Plan. 20
Results at the OMB 7% Discount Rate 21
REGIONAL ECONOMIC DEVELOPMENT IMPACTS OF RECOMMENDED PLAN 21
Background. 21
Methodology. 21
Assumptions. 22
Description of Metrics. 22
Results. 23
OPTIMIZATION OF LEVEL OF RISK REDUCTION 23
Optimization of Alternative C Levee Alignment System. 23
SENSITIVITY ANALYSIS 24
Alternative C Levee Alignment – Without Future Development 24
Alternative C Levee Alignment Without and With Localized Storm Surge Risk Reduction Measures - Without Future Development. 24

Recommended Plan - Without Future Development. 24
Sea Level Rise Scenarios. 25
RISK ANALYSIS 25
Benefit Exceedance Probability Relationship 25
Project Performance by Reach for the Years of Analysis 25

PART 1: BACKGROUND INFORMATION

INTRODUCTION

General. This appendix presents an economic evaluation of the Recommended Plan for the West Shore Lake Pontchartrain LA Hurricane and Surge Risk Reduction Feasibility Study. The evaluation area includes portions of three parishes in Southeast Louisiana. It was prepared in accordance with Engineering Regulation (ER) 1105-2-100, Planning Guidance Notebook, and ER 1105-2-101, Planning Guidance, Risk Analysis for Flood Damage Reduction Studies. The National Economic Development Procedures Manual for Flood Risk Management and Coastal Storm Risk Management, prepared by the Water Resources Support Center, Institute for Water Resources, was also used as a reference, along with the Users Manual for the Hydrologic Engineering Center Flood Damage Analysis Model (HEC-FDA).

The economic appendix consists of a description of the methodology used to determine National Economic Development (NED) damages under existing and future conditions and projects costs. The damages and costs were first calculated using October 2012 price levels but were later updated to October 2014 price levels using the Civil Works Construction Costs Index System (CWCCIS). Damages were converted to equivalent annual values using the FY 2014 Federal discount rate of 3.5 percent and a period of analysis of 50 years. The year 2020 was identified as the base year for each of the alternatives as the basis for plan comparison. Once the Recommended Plan was determined, the equivalent annual damage and benefit estimates, in addition to average annual construction and OMRR&R costs, were recalculated using the current FY 2015 Federal discount rate of 3.375 percent.

NED Benefit Categories Considered. The NED procedure manuals for coastal and urban areas recognize four primary categories of benefits for flood risk management measures: inundation reduction, intensification, location, and employment benefits. The majority of the benefits attributable to a project alternative generally result from the reduction of actual or potential damages caused by inundation. Inundation reduction, which is the only category of NED benefits addressed in this evaluation, includes the reduction of physical damages to structures, contents, and vehicles.

Physical Flood Damage Reduction. Physical flood damage reduction benefits include the decrease in potential damages to residential and commercial structures, their contents, and the privately owned vehicles associated with these structures. Damages included in the appendix considered both existing and future conditions. Projections of the future development expected to be in place in the study area during the period of analysis were included as part of the future condition analysis.

Office of Management and Budget survey forms were used to collect information on the value and placement of contents in the industrial facilities located in the study area. The information from these surveys was used to develop the physical flood damage and benefits for these industrial properties. This is applicable to the Zapps Potato Chip facility.

Emergency Cost Reduction Benefits. Emergency costs are those costs incurred by the community during and immediately following a major storm. They include the costs of emergency measures, such as evacuation and reoccupation activities conducted by local governments and homeowners, repair of streets, highways, and railroad tracks, and the subsequent cleanup and restoration of private, commercial, and public properties. Due to time and budget constraints, emergency costs were not quantified in this evaluation.

Regional Economic Development. When the economic activity lost in the flooded region can be transferred to another area or region in the national economy, these losses cannot be included in the NED account. However, the impacts on the employment, income, and output of the regional economy are considered part of the RED account. The input-output macroeconomic model RECONS was used to address the impacts of the construction spending only associated with the Recommended Plan, since only this alternative provides detailed cost information necessary to prepare a complete and accurate analysis. The RED account is addressed at the conclusion of this appendix.

DESCRIPTION OF THE STUDY AREA

Geographic Location. The study area includes the portions of St. James and St. John the Baptist Parishes located on the east bank of the Mississippi River and the portion of St. Charles Parish on the east bank of the Mississippi River west of the Bonnet Carre' Spillway. The West Shore Lake Pontchartrain evaluation area was divided into 81 unique hydrologic reaches to enable an economic analysis of the project alternatives through the use of the HEC-FDA certified model.

Land Use. The total number of acres of developed, agricultural, and undeveloped land in the study area is shown in Table 1. As shown in the table, approximately 5 percent of the total acres in the study area are currently developed. Since there are approximately 24,000 acres of agricultural land and 124,000 acres of undeveloped land there is sufficient land available to accommodate the projected residential and non-residential development through the year 2080 without impacting the wetlands in the area. This projected future development is expected to be located on parcels that tend to be relatively higher ground and are the least exposed to flood risk.

SOCIOECONOMIC SETTING

Population and Number of Households. Table 2 displays the population in each of the parishes for the years 1980, 1990, 2000, and 2010 as well as projections for the year 2020 and the year 2080, the two years that engineering inputs were modeled and used to calculate damages. Population projections are based on the Moody's County Forecast Database, which has population projections to the year 2038. Moody's projections were extended by New Orleans District from the year 2030 to the year 2080 based on the growth rate forecasted by Moody's for the years 2018 through 2038. As shown in Table 2, St. Charles, St. James and St. John Parishes experienced a steady increase in population between 1980 and 2010.

Table 3 displays the estimated population of the three parishes located within the inventoried portion of the study area for the year 2012 and the projected population for the years 2020 and 2070. The 2012 estimates are based on an inventory of residential and non-residential properties assembled in 2012 by field survey teams. The number of inventoried residential structures was then multiplied by 2.9, the average number of persons per household in the study area in 2012. The annual compounded growth rate in population between 2012 and 2020 is expected to be 0.32 percent and 0.77 percent between 2020 and 2070.

Table 4 shows the total number of households in each parish for the years 1980, 1990, 2000, and 2010 and projections for the years 2020 and 2080. The projected number of households was based on the Moody's County Forecast Database and extended from the year 2038 to the year 2080 based on the growth rate forecasted by Moody's for the years 2018 through 2038.

The three parishes experienced a steady increase in the total number of households between 1980 and 2010, which paralleled the growth in population. This increase is commensurate with the population growth experienced by the entire Gulf Coast region during the same period. Similar to the projected population growth in the three-parish area, the number of households is expected to continue increasing through the year 2080.

Income. Table 5 shows the per capita personal income levels for each parish for the years 1990, 2000, 2005, 2010 and 2012, the year with the latest available data. As shown in the table, both parishes experienced a steady increase in per capita income between 1990 and 2012.

Employment. Table 6 shows the total nonfarm employment by parish for the years 1970, 1980, 1990, 2000, 2010, and projections for the years 2020 and 2080. The employment projections were based on the Moody's County Forecast Database and extended from the year 2038 to the year 2080 based on the growth rate forecasted by Moody's for the years 2018 through 2038.

In all portions of the study area, growth is highly dependent upon the major employment sectors. The increase in employment in the three parishes is likely the result of the influx of population and businesses that occurred to the area after Hurricane Katrina after 2005. The leading employment sectors include educational services, health care and social assistance, manufacturing, and retail trade. Approximately 1,900 non-residential structures are located in the study area including petroleum service companies, river services companies, Zapp's Potato Chips Factory in Gramercy, and the Marathon refinery in Garyville. Slightly over 10 percent of the total acres in the study area, or 23,800 acres, is devoted to agriculture, and about half of these acres is used for growing sugar cane.

Compliance with Policy Guidance Letter (PGL) 25 and Executive Order 11988. Given continued growth in employment, it is expected that development will continue to occur in the study area with or without the storm surge risk reduction system, and will not conflict with PGL 25 and EO 11988, which state that the primary objective of a flood risk reduction project is to protect existing development, rather than to make undeveloped land available for more valuable uses. However, the overall growth rate is anticipated to be the same with or without the project in place. Thus, the project will not induce development, but would rather reduce the risk of the population being displaced after a major storm event.

RECENT FLOOD HISTORY

Tropical Flood Events. While the three parishes have periodically experienced localized flooding from excessive rainfall events, the primary cause of the flood events that have taken place in the three-parish study area has been the tidal surges from hurricanes and tropical storms. During the past 25 years, coastal Louisiana was impacted by eight major tropical events: Hurricane Juan (1985), Hurricane Andrew (1992), Tropical Storm Isidore and Hurricane Lili (2002), Hurricanes Katrina and Rita (2005), and Hurricanes Gustav and Ike (2008). While none of these storms tracked directly through the study area, the tidal surges associated with these storm events inundated structures and resulted in billions of dollars in damages throughout coastal Louisiana.

Table 7 provides a summary of the total Federal Emergency Management Agency (FEMA) flood claims paid to all Louisiana policyholders as a result of these tropical events. The table includes the number of paid losses, the total amount paid, and the

average amount paid on each loss. The total and average paid losses have been converted to reflect 2011 price levels. The table excludes losses that were not covered by flood insurance.

The following is a summary of each of the eight major tropical events and their effects on the two-parish area and coastal Louisiana.

Hurricane Juan. Hurricane Juan caused extensive flooding throughout southern Louisiana due to its prolonged 5-day movement back and forth along the Louisiana coast. Rainfall totals in the area ranged from 5 inches to almost 17 inches. The storm was responsible for storm surges of 5 to 8 feet and tides of 3 to 6 feet above normal. According to FEMA officials, the estimated value of the residential and commercial damage and public assistance throughout coastal Louisiana totaled $112.5 million.

Hurricane Andrew. On August 26, 1992, Hurricane Andrew made landfall in St. Mary Parish, 80 miles west of Morgan City. FEMA reported that over 2,000 flood claims were filed as a result of the storm in Louisiana. These claims had a total value of over $25 million.

Tropical Storm Isidore and Hurricane Lili. On October 3, 2002, one week after Tropical Storm Isidore affected the southeastern and south central coastal areas of Louisiana, Hurricane Lili made landfall on the western edge of Vermilion Bay south of the cities of Abbeville and New Iberia as a weak Category 2 hurricane. The high winds caused tidal flooding in the communities east of the eye of the storm.

Insured flood losses from Tropical Storm Isidore and Hurricane Lili totaled nearly $600 million. Approximately $105 million of insured losses were related to Tropical Storm Isidore, while Hurricane Lili caused $471 million of insured losses. According to windshield surveys conducted by the American Red Cross, approximately 10,000 residential structures were damaged by winds and storm surges of the two storms. These surveys included both insured and uninsured structures. Tropical Storm Isidore caused damage to 2,905 structures, while Hurricane Lili caused damage to 7,356 structures.

In a revised report released in mid-November by the Louisiana State University Agricultural Center (LSU AgCenter), the estimated agricultural damages caused by Tropical Storm Isidore and Hurricane Lili totaled $454.3 million. This estimate also includes the agricultural damages caused by the continuation of rain during the month of October, which delayed the harvesting of crops. The excessive rains and storm surge flooded the agricultural fields and increased the harvest costs.

Hurricane Katrina. On August 29, 2005, Hurricane Katrina made landfall near the town of Buras in Plaquemines Parish about 50 miles east of coastal Lafourche and Terrebonne parishes. While the storm entered as a category 3 storm with winds in excess of 120 mile per hour, its storm surge of approximately 30 feet was more characteristic of a Category 5

hurricane. The majority of the damages from Hurricane Katrina occurred outside of the West Shore Lake Pontchartrain study area. However, if the hurricane had taken a more westerly track, the study area could have experienced the same magnitude of flooding as the city of New Orleans.

According to the Department of Health and Hospitals, approximately 1,400 deaths were reported following Hurricane Katrina. Approximately 1.3 million residents were displaced immediately following the storm, and 900,000 residents remained displaced as of October 5, 2005.

The storm caused more than $40.6 billion of insured losses to the homes, businesses, and vehicles in six states. Approximately two thirds of these losses, or $25.3 billion, occurred in Louisiana based on data obtained from the Insurance Information Institute. According to the Louisiana Recovery Authority, approximately 150,000 housing units were damaged, and according to the Department of Environmental Quality, 350,000 vehicles, and 60,000 fishing and recreational vessels were damaged.

According to the LSU AgCenter, agricultural losses totaled approximately $825 million. The agricultural resources impacted by the storm include sugarcane, cotton, rice, soybeans, timber, pecans, citrus, and livestock. The losses to aquaculture (crawfish, alligators, and turtles), fisheries (shrimp, oysters, and menhaden), and wildlife and recreational resources totaled approximately $175 million.

Hurricane Rita. The hurricane made landfall along the Texas-Louisiana border on September 24, 2005, as a Category 3 storm with winds in excess of 120 miles per hour. A storm surge of approximately 15 - 20 feet affected Coastal Louisiana from Terrebonne Parish to the Texas border. With estimated insured losses of approximately $3 billion, Hurricane Rita became one of the most costly natural disasters in U.S. history.

Approximately 2,000 square miles of farmland and marshes throughout the coastal area were inundated. According to the LSU AgCenter, agricultural losses totaled approximately $490 million. The agricultural resources impacted by the storm include sugarcane, cotton, rice, soybeans, timber, pecans, citrus, and livestock. The losses to aquaculture (crawfish, alligators, and turtles), fisheries (shrimp, oysters, and menhaden), and wildlife and recreational resources totaled approximately $100 million.

Hurricanes Gustav and Ike. On September 1, 2008, almost exactly three years after Hurricane Katrina, Hurricane Gustav made landfall near Cocodrie in Terrebonne Parish as a strong Category 2 hurricane. It followed a northwest path into central Louisiana, and most of the damages caused by the storm resulted from its high winds and heavy rain. Coastal flooding occurred in the low lying areas of Jefferson and Lafourche Parishes and the coastal areas of Terrebonne Parish south of the City of Houma.

Nearly 2 million residents of South Louisiana evacuated in the days before Gustav made landfall. Louisiana officials reported that emergency spending totaled approximately $500 million, which included $210 million for state agencies, $48 million for deploying the National Guard, $13.5 million for general evacuation shelters, $3 million for special-needs medical shelters, $6.1 million for transporting the medical needy, $21 million for costs of contraflow and evacuation from coastal communities and other areas, $20 million in special generators to open ice plants, pharmacies and service stations throughout the impacted areas, $5 million for state-purchased fuel, $19.7 million for ready-to-eat meals, $5.3 million for ice, and $2.5 million for water supplies. The State Department of Transportation estimated that it cost approximately $50 million to remove 1.5 million cubic yards of debris, and approximately $20 million to repair draw bridges.

Almost two weeks later, on September 12 and 13, the Louisiana coastal region incurred additional flood damages as Hurricane Ike moved along the Louisiana coast. According to estimates from the state officials, approximately 12,000 homes and businesses were flooded by the two storms. Approximately 2,500 buildings in Terrebonne Parish south of the City of Houma incurred flood damages from Hurricane Ike.

The LSU AgCenter estimated that potential lost revenues and damages to the infrastructure of the agriculture, forestry, and fisheries industries in Louisiana resulting from the two hurricanes totaled approximately $959 million. The storm surge primarily affected the cattle, rice, soybeans, and sugarcane.

Hurricane Isaac. On 29 August 2012, exactly seven years to the day after Hurricane Katrina, Southeast Louisiana was impacted by Hurricane Isaac. The storm made landfall near the mouth of the Mississippi River as a minimal Category 1 hurricane. It then reentered the Gulf of Mexico and made a second landfall near Port Fourchon, Louisiana. Hurricane Isaac produced 45 hours of tropical force winds from the south and southeast as it slowly tracked west of the city of New Orleans. The wind speed and track, combined with slow forward motion, large maximum wind radius, and intense rainfall, produced high storm surges and water elevations throughout coastal Louisiana. Substantial flooding occurred in areas outside federal levee systems, including, but not limited to Slidell, Mandeville, Madisonville, LaPlace, Braithwaite, and Lafitte. In the study area, the hurricane flooded approximately 7,000 structures in the area of LaPlace. The flood claims attributed to Hurricane Isaac in St. John Parish were approximately $226,810,360. This figure is based on 3,332 flood claims reported by FEMA which does not include households without flood insurance policies.

FEMA Flood Claims. The study area has been impacted by numerous tropical events during the past several decades. According to FEMA data, flood claims for the three parishes in the West Shore-Lake Pontchartrain evaluation area that were paid between 1978 and December 2012 totaled $338 million: $100 million in St. Charles Parish, $236 million in St. John the Baptist Parish, and $1.74 million in St. James Parish. Table 8 shows the insurance payments between 1978 and December 2012 for each of the parishes in the study area.

SCOPE OF THE STUDY

Problem Description. The exposure of the study area to coastal storm surge was made apparent by Hurricane Isaac (August 2012). Approximately 7,000 structures in the study area were damaged and the I-10 and I-55 transportation routes were impassable for 6 days after the storm had passed, necessitating the use of alternative transportation routes. The damages and response times during Hurricane Isaac were exacerbated due to standing water for days after the event.

Project Alternatives. Four alternatives were considered as part of the evaluation. Alternative A consists of 20.41 miles of earthen levee, which begins at the West Guide levee of the Bonne Carre' Spillway. It extends west around the interstate interchange and along the wet/dry interface. The Recommended Plan follows the same alignment as Alternative A between the West Guide levee of the Bonnet Carre' Spillway to the US-51 Interchange where it tracks north across US-51. It consists of 18.27 miles of earthen levees and a T-wall. Both Alternatives A and C will implement voluntary localized storm surge risk reduction measures which include elevation of structures and acquisition by government in the western portion of the study area. Alternative D is a westward continuation of The Recommended Plan along the I-10 corridor into Ascension Parish. At the St. James Parish line, Alternative D continues west just slightly north of I-10 until it reaches Old New River where it will proceed north to a non-federal levee in Ascension Parish (Laurel Ridge Levee). There are no localized storm surge risk reduction measures involved in this alternative.

Alternative C was determined to be the Recommended Plan for the 0.01 annual exceedance probability (AEP) level of risk reduction. The alternative includes the construction of levee alignment C in St. John the Baptist and St. Charles parishes, along with localized storm surge risk reduction measures in St. James Parish. These measures in St. James Parish include the construction of three berms built to the elevation 6.5 feet NGVD and the installation of flap gates for the culverts along Highway 3125. For areas located outside of the influence of berms and flap gates that contain structures with first floor elevations below the stages associated with the 2020 1% (100-year) ACE event, 14 residential structures will be raised to the stage associated with the 2070 1% (100-year) ACE event; 4 non-residential structures will be flood proofed to 3 feet above the ground elevation; and smaller berms will be constructed for 5 light industrial/warehouse facilities.

PART 2: ECONOMIC AND ENGINEERING INPUTS TO THE HEC-FDA MODEL

HEC-FDA MODEL

Model Overview. The Hydrologic Engineering Center Flood Damage Analysis (HEC-FDA) Version 1.2.5a Corps-certified model was used to calculate the damages and benefits for the West Shore Lake Pontchartrain evaluation. The economic and engineering inputs necessary for the model to calculate damages for existing conditions (2012), the project base year (2020), and the final year in the period of analysis (2070) include structure inventory, future development, contents-to-structure value ratios, vehicles, first floor elevations, and depth-damage relationships, ground elevations, and without-project stage probability relationships.

The uncertainty surrounding each of the economic and engineering variables was also entered into the model. Either a normal probability distribution, with a mean value and a standard deviation, or a triangular probability distribution, with a most likely, a maximum and a minimum value, was entered into the model to quantify the uncertainty associated with the key economic variables. A normal probability distribution was entered into the model to quantify the uncertainty surrounding the ground elevations. The number of years that stages were recorded at a given gage was entered for each study area reach to quantify the hydrologic uncertainty or error surrounding the stage-probability relationships.

ECONOMIC INPUTS TO THE HEC-FDA MODEL

Structure Inventory. Field surveys were completed in 2012 (prior to Hurricane Isaac) to develop a residential and non-residential structure inventory for the economic analysis. Based on the structural information collected during the field surveys, the Marshall and Swift Valuation Service was used to calculate a depreciated replacement cost for all residential and non-residential structures in the study area reaches. The inventoried structures were classified as one of 14 structure types: residential one-story with slab or pier foundation, residential two-story with slab or pier foundation, mobile home, eating and recreation, grocery and gas station, multi-family residence, professional building, public and semi-public building, repairs and home use establishment, retail and personal services building, and warehouse, and contractor services building. Table 9 shows the number of structures by structure category and the total number of vehicles associated with the residential structures for existing conditions (2012) for each study area reach or HEC-FDA model station number. The value of the land was not included in the analysis.

Future Development Inventory. Projections were made of the future residential and non-residential development to take place in the West Shore Lake Pontchartrain study area under without-project conditions. Based on a pattern of historical development, a total of 565 residential and 149 non-residential structures were placed on the undeveloped land within the study area reaches as part of the structure inventory for the year 2020. An additional 10,428 residential and 679 non-residential structures were added to the inventory for the year 2020 to obtain the structure inventory for the year 2070.

The development projected to occur in each study area reach between the year 2012 and the year 2020 was placed at an elevation equal to the stage associated with the 2020 without-project one percent annual chance exceedance (1% ACE) 100-year event, unless the ground elevation was higher. The projected development occurring after the year 2020 was placed at an elevation equal to the stage associated with the without-project 1% ACE (100-year) event for the year 2070, unless the ground elevation was higher. The values for the projected residential and non-residential structures were assigned using the average value calculated for each structure category based on the 2012 existing development.

Table 10 shows the number of structures in each structure category and the average depreciated replacement values for (2012 price level) existing conditions. Table 11 shows the projected number of structures in each structure category for the future years 2020 and 2070, respectively. The value of the land was not included in the analysis.

Residential and Non-Residential Content-to-Structure Value Ratios. Content-to-structure value ratios (CSVRs) were developed based on the on-site interviews conducted as part of the Jefferson-Orleans, Donaldsonville to the Gulf, and Morganza to the Gulf evaluations. These interviews were conducted with the owners of a sample of structures from each of the three residential content categories and each of the eight non-residential content categories from each of the three evaluation areas. Thus, a total of 96 residential structures and 210 non-residential structures were used to determine the CSVRs for each of the residential and non-residential categories.

Since only a limited number of property owners participated in the field surveys and the participants were not randomly selected, statistical bootstrapping was performed to address the potential sampling error in estimating the mean and standard deviation of the CSVR values. Statistical bootstrapping is a method that uses re-sampling with replacement to improve the estimate of a population statistic when the sample size is insufficient for straightforward statistical inference. The bootstrapping method has the effect of increasing the sample size. Thus, bootstrapping provides a way to account for the distortions caused by the specific sample that may not be fully representative of the population.

As shown in Table 12, a CSVR was computed for each residential and non-residential structure in the sample based on the total depreciated content value developed from the surveys. An average CSVR and standard deviation for each of the five residential structure categories and nine commercial structure classifications was calculated as the average of the individual structure CSVRs.

Vehicle Inventory. Based on 2000 Census block group data for the evaluation area, it was determined that there are an average of 1.74 vehicles associated with each household (owner occupied housing or rental unit). According to the Southeast Louisiana Evacuation Behavioral Report published in 2006 following Hurricanes Katrina and Rita, approximately 70 percent of privately owned vehicles are used for evacuation during storm events. The remaining 30 percent of the privately owned vehicles remain parked at the residences and are subject to flood damages. Using the Manheim Used Vehicle Value Index, which is based on over 4 million annual automobile transactions adjusted to reflect retail replacement value, each vehicle was assigned an average value of $12,879 at the 2012 price level. Since only those vehicles not used for evacuation can be included in the damage calculations, an adjusted average vehicle value of $6,723 ($12,879 x 1.74 x 0.30) was assigned to each individual residential structure record in the HEC-FDA model. This figure was rounded to $7,000 per vehicle for the calculation of damages. If an individual structure had more than one housing unit, then the adjusted vehicle value was assigned to each housing unit in a residential or multi-family structure category.

First Floor Elevations and Elevation of Vehicles. Topographical data obtained from the Light Detection and Ranging (LIDAR) digital elevation model (DEM) using the NAVD88 (2004.65 epoch) were used to determine ground elevations. Field survey teams estimated the height of each residential and non-residential structure above the ground using hand levels. The ground elevation was added to the height of the foundation of the structure above the ground in order to determine the first floor elevation of the structure. Vehicles were assigned to the ground elevation of the adjacent residential structures.

Depth-Damage Relationships. Site-specific saltwater, long duration (approximately one week) depth-damage relationships, developed by a panel of building and construction experts for a separate study in Jefferson and Orleans Parishes, were used in the economic analysis. The Jefferson Orleans study area is adjacent to West Shore Lake Pontchartrain study area, approximately 25 miles to the east. These curves indicate the percentage of the total structure value that would be damaged at various depths of flooding. Damage percentages were determined for each one-half foot increment from one-half foot below first floor elevation to two feet above first floor, and for each one-foot increment from 2 feet to 15 feet above first floor elevation. The panel of experts developed depth-damage relationships for five residential structure categories and for three commercial structure categories. Depth-damage relationships were also developed for three residential content categories and eight commercial content categories.

Based on observations after Hurricane Katrina, mold and mildew only affects the contents located on the second floor of residential structures if the depth of flooding reaches the second floor. Thus, an adjustment was made to only include damages to second floor contents in cases where the depth of flooding extended above the first floor. This more adequately represents damages to the contents of two story residential structures.

The depth-damage relationships for vehicles were developed based on interviews with the owners of automobile dealerships that had experienced flood damages and were used to calculate flood damages to vehicles at the various levels of flooding.

Table 13 shows the residential and non-residential depth-damage relationships developed for structures, contents, and vehicles. More specific data regarding the depth-damage relationships can be found in the final report in support of Jefferson and Orleans Flood Control Feasibility Study (June 1996).

A post-flood survey was conducted to obtain damage information from residents in the study area whose properties had incurred flood damage from Hurricane Isaac. The owners of five one-story residential structures participated in the survey. The residents were asked to provide structural information that could be used to determine the depreciated replacement cost of their homes and the depth of flooding above first floor elevation, the dollar value of the damage to their structure, and the percentage of the contents damaged as a result of Hurricane Isaac. The residents were also asked to provide the dollar value of the damage to their vehicles. The information obtained from the surveys was then compared to the depth-damage relationships used in the evaluation. An evaluation of these data showed that residential one story structures receiving an average of 1.4 feet of flooding had an average of 61 percent of the structure damaged and 80 percent of the contents damaged. In addition, the vehicles were shown to be 100 percent damaged at an average of 1.4 feet of flooding. This empirical evidence closely correlates with the information received from the expert elicitation used in the salt-water, long-duration depth damage functions.

Uncertainty Surrounding the Economic Inputs. The uncertainty surrounding the four key economic variables was quantified and entered into the HEC-FDA model. These economic variables included structure values, contents-to-structure value ratios, first floor elevations, and depth-damage relationships. The HEC-FDA model used the uncertainty surrounding these variables to estimate the uncertainty surrounding the stage-damage relationships developed for each study area reach.

Structure and Vehicle Values. In order to quantify the uncertainty surrounding the values calculated for the residential and non-residential structure inventory, several survey teams valued an identical set of structures from various evaluation areas in the Gulf Coast region. The structure values calculated by each of the teams during windshield surveys were used to

develop a mean value and a standard deviation for each structure in the sample. The standard deviation was then expressed as a percentage of the mean value for that structure. The average standard deviation as a percentage of the mean for the sampled structures was then used to represent the uncertainty surrounding the structure value for all the inventoried residential and non-residential structures. The average standard deviation, which was expressed as a percentage of the mean structure value, totaled 11.4 percent for residential structures and 11.6 percent for non-residential structures.

The uncertainty surrounding the values assigned to the vehicles in the inventory was determined using a triangular probability distribution function. The Manheim vehicle value, adjusted for number of vehicles per household and for the evacuation of vehicles prior to a storm event, was used as the most likely value. The average value of a new vehicle before taxes, license, and shipping charges was used as the maximum value, while the average 10-year depreciation value of a vehicle was used as the minimum value.

Content-to-Structure Value Ratios. A CSVR was computed for each residential and non-residential structure in the sample based on the total depreciated content value developed from these interviews. The mean and standard deviation values for each residential and non-residential category were entered into the HEC-FDA model after applying statistical bootstrapping. The model used a normal probability density function to describe the uncertainty surrounding the CSVR for each content category. The expected values and standard deviations are shown for each of the three residential categories and the eight non-residential categories are shown in Table 12.

First Floor Elevations. The topographical data used to estimate the first floor elevations assigned to the structure inventory contain two sources of uncertainty. The first source of uncertainty arises from the use of the 2009 LIDAR data, and the second source of uncertainty arises from the use of hand levels to determine the structure foundation heights above ground elevation. The error implicit in using LIDAR data to estimate the ground elevation of each of the inventoried structures is normally distributed with a mean of zero and a standard deviation of 0.6 feet. According to the Hydrologic Engineering Center training manual, and the uncertainty implicit in estimating foundation heights using hand levels from within 50 feet of the structure is normally distributed with a mean of zero and a standard deviation of 0.3 feet at the 95 percent level of confidence.

Depth-Damage Relationships. A triangular probability density function was used to determine the uncertainty surrounding the damage percentage associated with each depth of flooding. A minimum, maximum and most likely damage estimate was provided by a panel of experts for each depth of flooding. The specific range of values regarding probability distributions for the depth-damage curves can be found in the final report dated June 1996 entitled *Depth-Damage Relationships for Structures, Contents, and Vehicles and Content-to-Structure Value Ratios (CSVRs)in Support of the Jefferson and Orleans Flood Control Feasibility Studies*.

ENGINEERING INPUTS TO THE HEC-FDA MODEL

Ground Elevations. Geospatial Engineering acquired elevation data for the West Shore Lake Pontchartrain study area. The LIDAR data were processed and used to create a digital elevation model (DEM) with a five-foot by five-foot horizontal grid resolution. The DEM used NAVD88 2004.65 vertical datum to determine the ground elevations for each of the residential and non-residential structures in the evaluation area.

Stage-Probability Relationships. Stage-probability relationships were provided for the existing (2012) without-project condition, future without-project conditions (2020 and 2070) and for future with-project conditions 0.01 AEP level of risk reduction (2020 and 2070). Water surface profiles were provided for eight annual chance exceedance (ACE) events: 99% (1-year), 20% (5-year), 10% (10-year), 4% (25-year), 2% (50-year), 1% (100-year), 0.5% (200-year), and 0.2% (500-year). The without-project water surface profiles were based on storm surge and incorporated heavy rainfall events. The with-project water surface profiles were based only on rainfall.

The 99% ACE (1-year) event, 20% ACE (5-year) event, and 10% ACE (10-year) event water surface profiles for the year 2012 were based on gage data for the without-project condition. For each of these ACE events, the water surface profiles for the years 2020 and 2070 were determined by adding relative sea level rise to the gage data. The water surface profiles for the 2% ACE (50-year) event through the 0.2% ACE (500-year) event were based on results from the ADCIRC model. The 4% ACE (25-year) event stages were determined by interpolation between the 10% ACE (10-year) event stages and the 2% ACE (50-year) event stages.

Uncertainty Surrounding the Engineering Inputs. The uncertainty surrounding two key engineering parameters was quantified and entered into the HEC-FDA model. These engineering variables included ground elevations and the stage-probability curves. The HEC-FDA model used the uncertainty surrounding these variables to estimate the uncertainty surrounding the elevation of the storm surges for each study area reach.

Ground Elevations. An engineering survey was conducted to estimate the uncertainty surrounding the use of the 2009 LIDAR data to estimate ground elevations in urbanized areas. A combination of the uncertainty surrounding the ground elevations and the foundation height (0.6 feet) of a residential and non-residential structure was discussed in the first floor elevation uncertainty section of this report.

Stage-Probability Relationships. A 50-year equivalent record length was used to quantify the uncertainty surrounding the stage-probability relationships for each study area reach. Based on this equivalent record length, the HEC-FDA model calculated the confidence limits surrounding the stage-probability functions.

PART 3: NATIONAL ECONOMIC DEVELOPMENT (NED) FLOOD DAMAGE AND BENEFIT CALCULATIONS

HEC-FDA Model Calculations. The HEC-FDA model was utilized to evaluate flood damages using risk-based analysis. Damages were reported at the index location for each of the 83 study area reaches for which a structure inventory had been conducted. A range of possible values, with a maximum and a minimum value for each economic variable (first floor elevation, structure and content values, and depth-damage relationships), was entered into the HEC-FDA model to calculate the uncertainty or error surrounding the elevation-damage, or stage-damage, relationships. The model also used the number of years that stages were recorded at a given gage to determine the hydrologic uncertainty surrounding the stage-probability relationships.

The possible occurrences of each variable were derived through the use of Monte Carlo simulation, which used randomly selected numbers to simulate the values of the selected variables from within the established ranges and distributions. For each variable, a sampling technique was used to select from within the range of possible values. With each sample, or iteration, a different value was selected. The number of iterations performed affects the simulation execution time and the quality and accuracy of the results. This process was conducted simultaneously for each economic and hydrologic variable. The resulting mean value and probability distributions formed a comprehensive picture of all possible outcomes.

Stage-Damage Relationships with Uncertainty. The HEC-FDA model used the economic and engineering inputs to generate a stage-damage relationship for each structure category in each study area reach under existing (2012) and future (2020 and 2070) conditions. The possible occurrences of each economic variable were derived through the use of Monte Carlo simulation. A total of 1,000 iterations were executed by the model for the West Shore Lake Pontchartrain evaluation. The sum of all sampled values was divided by the number of samples to yield the expected value for a specific simulation. A mean and standard deviation was automatically calculated for the damages at each stage.

Stage-Probability Relationships with Uncertainty. The HEC-FDA model used an equivalent record length (50 years) for each study area reach to generate a stage-probability relationship with uncertainty for the without-project condition under existing (2012) and future (2020 and 2070) conditions through the use of graphical analysis. The model used the eight stage-probability events together with the equivalent record length to define the full range of the stage-probability or stage-probability functions by interpolating between the data points. Confidence bands surrounding the stages for each of the probability events were also provided.

Without-Project Expected Annual Damages. The model used Monte Carlo simulation to sample from the stage-probability curve with uncertainty. For each of the iterations within the simulation, stages were simultaneously selected for the entire range of probability events. The sum of all damage values divided by the number of iterations run by the model yielded the expected value, or mean damage value, with confidence bands for each probability event. The probability-damage relationships are integrated by weighting the damages corresponding to each magnitude of flooding (stage) by the percentage chance of exceedance (probability). From these weighted damages, the model determined the expected annual damages (EAD) with confidence bands (uncertainty). For the without-project alternative, the expected annual damages (EAD) were totaled for each study area reach to obtain the total without-project EAD under existing (2012) and future (2020 and 2070) conditions. Table 14 shows the number and type of structures that are damaged by each of annual chance exceedance events for the years 2020 and 2070 under without-project conditions using the intermediate sea level rise scenario. Table 15 shows the without-project damages by probability event for the years 2020 and 2070 using the intermediate sea level rise scenario.

Structure Inventory Adjustments for Repetitive Flooding. Adjustments were made to the structure inventory before executing the HEC-FDA model to more accurately reflect the most likely future without-project and with-project conditions. Under without-project and with-project conditions, owners of those structures that were identified as repetitively flooded structures are expected to take remedial measures to reduce flood risk rather than incur repair costs a highly frequent basis. To account for this effect, for the 2020 residential and non-residential structure inventory, all structures with a first floor elevation less than or equal to the 2012 10% ACE (10-year) water surface elevation within each study area reach were elevated to the stage associated with the 2070 1% ACE (100-year) event using the historic rate of sea-level rise scenario projected to occur during the period of analysis. This would also ensure that the structures would not be located within the 100-year floodplain during the period of analysis. The first floor elevations of 241 residential and 81 non-residential structures were adjusted for repetitive flooding. All but 10 structures would be behind the levee system. The remaining 10 structures are south of hwy 3125 and only decreases the available benefits associated with the flap gates.

Equivalent Annual Damages. Damages for each of the years during the period of analysis were computed by linear interpolation between 2020 and 2070. The FY 2014 Federal discount rate of 3.5 percent was used to compound the stream of expected annual damages and benefits before the project base year and to discount the stream of expected annual damages and benefits occurring after the base year to calculate the total present value of the damages over the period of analysis. The present value of the expected annual damages was then amortized over the period of analysis using the Federal discount rate to calculate the equivalent annual damages. Table 16 shows the equivalent annual without-project damages, with-project damages, equivalent annual benefits in both 2012 and inflated 2014 prices for each flood risk management component using projected intermediate sea level rise. It should be noted that future development was not included in the damage and benefit estimates for the proposed localized storm surge risk

reduction measures in St. James Parish. Since future development was not included in the damage and benefit calculations for the localized flood risk reduction components in St. James Parish, then the future development in St. James Parish was also excluded in the damage and benefit calculations for the Recommended Plan. This was done in order to have consistent damage results for all the individual components totaled and the results for the components combined into one model. Table 17 shows the equivalent annual without-project damages, with-project damages, equivalent annual benefits in both 2012 and inflated 2014 prices for the Recommended Plan by study area reaches using projected intermediate sea level rise.

PART 4: PROJECT COSTS OF THE RECOMMENDED PLAN

Construction Schedule. Construction of the Recommended Plan is expected to begin in the year 2015 and will continue through the year 2020, which is established as the base year for analysis. For the 0.01 ACE level of risk reduction structural system component of this plan, four levee lifts are scheduled after the year 2020 to maintain the design elevation. The first levee lift will be overbuilt and allowed to settle for several years before the later levee lifts are added. The later lifts will account for the relative sea-level rise and subsidence that is projected to occur throughout the period of analysis. Construction of the berms and the installation of the flap gates on culverts are expected to begin in the year 2018 and be completed in the year 2019. Other localized storm surge risk reduction measures are implemented in the year 2019.

Average Annual Costs. Life cycle cost estimates were provided for the Alternative C levee alignment system in October 2014 price levels. The localized flood risk reduction components for the Recommend Plan, which included the costs associated with structure elevation, flood proofing and smaller berms for selected light industry/warehouse facilities, were initially estimated at 2012 price levels and inflated to 2014 price levels using the CWCCIS. The initial construction cost (first costs), along with the schedule of expenditures, were used to determine the interest during construction and gross investment cost at the end of the installation period (2020). The FY 2014 Federal discount rate of 3.5 percent was used to discount the costs to the base year and then amortize the costs over the 50-year period of analysis. The costs for the recommend plan are also shown using the current FY 2015 Federal discount rate of 3.375 percent.

The operations, maintenance, relocations, rehabilitation, and repair (OMRR&R) costs for each component of the Recommended Plan during the period of analysis was discounted to present value and annualized using the Federal discount rate of 3.5 percent for 50 years. The OMRR&R costs for the recommend plan were also annualized using the current FY 2015 discount rate of 3.375 percent.

Tables 18 through 24 C provide the life cycle costs for each of the project components, the average annual construction costs, the annual operation and maintenance costs, and the total average annual costs. The interest during construction costs is also included in the calculation of total average annual costs. Tables 25 through 31 C displays the annualization of OMRR&R costs over the period of analysis.

PART 5: RESULTS OF THE ECONOMIC ANALYSIS

NET BENEFIT ANALYSIS

Calculation of Net Benefits. The expected annual benefits attributable to the project alternative were converted to an equivalent time frame by using the FY14 Federal discount rate of 3.5 percent, and also at the current FY 2015 Federal discount rate of 3.375 percent for the Recommended Plan. The base year for this conversion is the year 2020 for the Recommended Plan. The equivalent annual benefits were then compared to the average annual costs to develop a benefit-to-cost ratio for the alternative. The net benefits for the alternative were calculated by subtracting the average annual costs from the equivalent annual benefits. The net benefits were used to determine the economic justification of the project alternative.

Net Benefits for the Flood Risk Management Project Components including Levee Alignment Alternative C and all Localized Storm Surge Risk Reduction Measures. Tables 32 through 37 summarize the equivalent annual damages and benefits, total annual costs, benefit-to-cost ratio, and equivalent annual net benefits for each component of the system analyzed. The benefits and costs are displayed in both 2012 and 2014 price levels. The benefits were originally calculated in 2012 price levels and the costs were calculated in 2014 price levels. The Civil Works Construction Cost Index System (CWCCIS) was used to price level the benefits and costs. Table 38 A contains the information mentioned above for the localized storm surge risk reduction measures outside of the structural levee system and Table 38 B shows the same results excluding Berm 2, given that this increment was not economically justified. Table 39 A summarizes the equivalent annual damages and benefits, total annual costs, benefit-to-cost ratio, and equivalent annual net benefits for the all components analyzed in the West Shore Lake Pontchartrain study area. This includes both the structural levee alignment and all localized storm surge risk reduction measures.

Net Benefits for the Recommended Plan. The equivalent annual damages and benefits, total annual costs, benefit-to-cost ratio, and equivalent annual net benefits for the Recommended Plan are displayed in Table 39 B. This includes Alternative C levee alignment and all of the localized storm surge risk reduction measures excluding Berm 2. The Recommended Plan has higher equivalent annual net benefits than the plan including Berm 2, and thus constitutes the National Economic Development (NED) Plan. Table 39 C shows the results from a single execution of the HEC-FDA model combining all flood

risk management components as a system (structural and localized storm surge risk reduction measures excluding Berm 2). Table 39 D shows the net benefits for the recommend plan using the current FY 2015 Federal discount rate of 3.375 percent. Estimates of EAD and benefits displayed as the summation of model executions for each individual FRM component varies from the estimates displayed for a model execution combining all flood risk management components is attributable to the manner in which the aforementioned Monte Carlo simulations are performed when system components are permitted to interact with each other.

Results at the OMB 7% Discount Rate. Project costs, OMRR&R, equivalent annual project damages, benefits, and net benefits are similarly displayed in Tables 40 through 61 C using the Office of Management and Budget (OMB) discount rate of 7 percent.

REGIONAL ECONOMIC DEVELOPMENT IMPACTS OF RECOMMENDED PLAN

Background. The Westshore Lake Pontchartrain hurricane risk reduction system consists of a levee alignment in St. Charles and St. John the Baptist Parishes and a series of localized storm surge risk reduction measures including the construction of berms, the installation of flap gates, the raising residential structures, and the floodproofing nonresidential structures in St. James Parish. This system is being implemented in response to reoccurring hurricane storm damage and is designed to prevent loss of life and to reduce flood damages. For this analysis, the regional economic development (RED) effects of implementing the components of the Westshore Lake Pontchartrain hurricane risk reduction system will be estimated. The RECONS impact area the Gulf of Louisiana consisting of the New Orleans and Baton Rouge Metropolitan Statistical Areas was selected based on the labor market, commuter-shed, and population centers serving the project area. According to RECONS' 2009 data, the population of the study area is 2,199,734. The number of households is 816,005. Total personal income is $90,517 million (Table 62).

Methodology. This Regional Economic Development (RED) analysis employs input-output economic analysis, which measures the interdependence among industries and workers in an economy. This analysis uses a matrix representation of a region's economy to predict the effect of changes in one industry on others. The greater the interdependence among industry sectors, the larger the multiplier effect on the economy. Changes to government spending drive the input-output model to project new levels of sales (output), value added (GRP), employment, and income for each industry.

The specific input-output model used in this analysis is RECONS (Regional Economic System). This model was developed by the Institute for Water Resources (IWR), Michigan State University, and the Louis Berger Group. RECONS uses industry multipliers derived from the commercial input-output model IMPLAN to estimate the effects that spending on USACE projects has on a regional economy. The model is linear and static, showing relationships and impacts at a certain fixed point in time. Spending impacts are composed of three different effects: direct, indirect, and induced.

Direct effects represent the impacts the new federal expenditures have on industries which directly support the new project. Labor and construction materials can be considered direct components to the project. Indirect effects represent changes to secondary industries that support the direct industries. Induced effects are changes in consumer spending patterns caused by the change in employment and income within the industries affected by the direct and induced effects. The additional income workers receive via a project may be spent on clothing, groceries, dining out, and other items in the regional area.

The inputs for the RECONS model are expenditures that are entered by work activity or industry sector, each with its own unique production function. The production function "FRM Construction" was selected to gauge the impacts of the construction of the levee, the berms, the installation of the flap gates, the structure raising, and the floodproofing of structures. The production function "FRM Operations and Maintenance" was selected to gauge the impacts of the operations and maintenance costs associated with the features of the system. The baseline data used by RECONS to represent the regional economy of Louisiana are annual averages from the Bureau of the Census, the Bureau of Labor Statistics, and the Bureau of Economic Analysis for the year 2009. The model results are expressed in 2014 dollars.

Assumptions. Input-output analysis rests on the following assumptions. The production functions of industries have constant returns to scale, so if output is to increase, inputs will increase in the same proportion. Industries face no supply constraints; they have access to all the materials they can use. Industries have a fixed commodity input structure; they will not substitute any commodities or services used in the production of output in response to price changes. Industries produce their commodities in fixed proportions, so an industry will not increase production of a commodity without increasing production in every other commodity it produces. Furthermore, it is assumed that industries use the same technology to produce all of its commodities. Finally, since the model is static, it is assumed that the economic conditions of 2009, the year of the socio-economic data in the RECONS model database, will prevail during the years of the construction process.

Description of Metrics. "Output" is the sum total of transactions that take place as a result of the construction project, including both value added and intermediate goods purchased in the economy. "Labor Income" includes all forms of employment income, including employee compensation (wages and benefits) and proprietor income. "Gross Regional Product (GRP)" is the value-added output of the study regions. This metric

captures all final goods and services produced in the study areas because of the project's existence. It is different from output in the sense that one dollar of a final good or service may have multiple transactions associated with it. "Jobs" is the estimated worker-years of labor required to build the project.

Results. For the region including the study area, the construction stimulus of $1.066 billion would generate 15,773 worker-years of labor, $853,482,895 in labor income, $1,743,979,232 in output, and $1,130,044,210 in Gross Regional Product (see Table 62). For the state of Louisiana as a whole, the construction stimulus would generate 16,623 worker-years of labor, $907,236,790 in labor income, $1,837,864,861 in output, and $1,198,467,210 in Gross Regional Product (see Table 62).

The impact area captures about 90% of the direct spending on the project. About 4% of the spending leaks out into other parts of the state of Louisiana. The rest of the nation captures about 6%. The secondary impacts, the combined indirect and induced multiplier effects, account for nearly 44% of the total output, about 38% of employment, 33% of labor income, and almost 42% of gross regional product in the impact area.

OPTIMIZATION OF LEVEL OF RISK REDUCTION

Optimization of Alternative C Levee Alignment System. The 0.02 (50-year) AEP, 0.01 (100-year) AEP, and 0.005 (200-year) AEP levels of risk reduction (LORR) were estimated using the stage-probability relationships for the without-project conditions. A top of levee elevation was also entered into the HEC-FDA model for each of the three LORRs equal to the 0.02 (50-year) ACE stage, the 0.01 (100-year) ACE stage, and the 0.005 (200-year) ACE stage, respectively. While detailed engineering inputs were available for the 0.01 (100-year) AEP, only the without-project stage-probability relationships with a top of levee elevation was used to analyze the 0.01 (100-year) AEP in order to maintain consistency in results for optimization purposes. It should be noted that the results for the 0.01 (100-year) AEP using only the without-project conditions with a top of levee elevation will not be equivalent to the results based on the detailed engineering inputs. However, this approach can be used to show the level of risk reduction that generates the highest level of net benefits.

The HEC-FDA model was used to calculate the expected annual without and with-project damages for each of the three levels of risk reduction for 2020 and 2070. The expected annual damage values were then converted to equivalent annual damages using the FY 2014 Federal discount rate and a 50-year period of analysis. The equivalent annual without project damages minus the equivalent annual damages for each of the three LORRs were used to calculate the equivalent annual benefits.

Preliminary project costs which were later revised for final draft report were only available for the 0.01 (100-year) AEP level of risk reduction for the Alternative C

alignment levee system. The costs for the 0.01 (100-year) AEP level of risk reduction were adjusted to reflect costs for the 0.02 (50-year) AEP and the 0.005 (200-year) AEP levels of risk reduction based on adjustments to reflect additional levee height, quantity of fill, relocations, railroad gates, mitigations and administrative costs. The costs were annualized using the FY 2014 Federal discount rate, a 50-year period of analysis, and 2014 price levels. The level of risk reduction with the highest net benefits was determined to be the 100-year level of risk reduction for Alternative C levee alignment system in St. Charles and St. John parishes. The results of the optimization for the 0.02 (50-year) AEP, 0.01 (100-year) AEP and the 0.005 (200-year) AEP are shown in Tables 63, 64, and 65.

SENSITIVITY ANALYSIS

Alternative C Levee Alignment – Without Future Development. The projected development was removed from the structure inventory for the study area reaches receiving risk reduction from the Alternative C Levee Alignment System. Table 66 shows the benefits, benefit-to-cost ratio and net benefits for the levee alignment without future development.

Alternative C Levee Alignment Without and With Localized Storm Surge Risk Reduction Measures - Without Future Development. Table 67 shows the benefits, benefit-to-cost ratio and net benefits for Levee alignment C including all of the localized storm surge risk reduction measures when removing the future development from the structure inventory. Tables 68 and 69 show the net benefits for the Alternative C Levee Alignment and Alternative C Levee alignment including the localized storm surge risk reduction measures at the 7 percent OMB interest rate.

Recommended Plan - Without Future Development. Tables 69 B and 69 C displays the benefits, benefit-to-cost ratio and net benefits for the Recommended Plan which includes the Alternative C Levee Alignment and localized storm surge risk reduction measures excluding Berm 2 with future development removed from the structure inventory. Table 69 D and E show the results from a single execution of the HEC-FDA model at both the 3.5 percent and 7 percent discount rates combining all flood risk management components as a system (structural and localized storm surge risk reduction measures excluding Berm 2). Estimates of EAD and benefits displayed as the summation of model executions for each individual FRM component varies from the estimates displayed for a model execution combining all flood risk management components is attributable to the manner in which the aforementioned Monte Carlo simulations are performed when system components are permitted to interact with each other.

Sea Level Rise Scenarios. The without-project conditions for Alternative C Levee Alignment for the three sea level rise scenarios, low/ historic, intermediate, and high were estimated using the HEC-FDA model results from the draft report and the intermediate sea level rise model results from the current analysis. The difference in without-project damages between the intermediate and low sea level rise and the difference in damages between the intermediate and high sea level rise was applied to the intermediate without-project damages using updated engineering inputs. The percent reduction in the without-project damages for the intermediate sea-level rise in the current phase of the analysis was applied to the without-project damages for the two other sea level rise scenarios previously calculated. The benefits were then calculated for low and high sea level rise applying the percent reduction in damages that was calculated with the Alternative C levee alignment in place. The benefits were then compared to the project costs for the three sea level rise scenarios. Estimates of without-project damages were revised based in the current phase due to refinement of engineering inputs. The results of the sea level rise scenarios are shown in Table 70. The sea-level rise scenarios without future development are shown in Table 71. The analysis shows that the Recommended Plan is economically justified for all sea level rise scenarios with or without future development.

RISK ANALYSIS

Benefit Exceedance Probability Relationship. The HEC-FDA model used the uncertainty surrounding the economic and engineering inputs to generate results that can be used to assess the performance of the Recommended Plan. A spreadsheet was developed using the expected annual damage and benefit results from the HEC-FDA model to calculate the equivalent annual without-project and with-project damages and the damages reduced for each of the project alternatives. Table 72 shows the equivalent annual benefits at the 75, 50, and 25 percentiles. These percentiles reflect the percentage chance that the benefits will be greater than or equal to the indicated values. The benefit exceedance probability relationship for each of the project alternatives can be compared to the point estimate of the average annual costs for each of the project alternatives. The table indicates the percent chance that the equivalent annual benefits will exceed the equivalent annual costs therefore the benefit cost ratio is greater than one and the net benefits are positive.

Project Performance by Reach for the Years of Analysis. The results from the HEC-FDA model were also used to calculate the long-term annual exceedance probability (AEP) and the conditional non-exceedance probability, or assurance, for various probability storm events. The model provided a target stage to assess project performance for each study area reach for the base year, 2020, and the last year in the 50-year period of analysis under both without-project and with-project conditions. For study area reaches without proposed levees or berms, the target stage was set by default at the elevation where the model calculated five percent residual damages for the 1% ACE (100-year) event.

The HEC-FDA model calculated a target stage AEP with a median and expected value that reflected the likelihood that the target stages will be exceeded in a given year. The median value was calculated using point estimates, while the expected value was calculated using Monte Carlo simulation. The results also show the long-term risk or the probability of a target stage being exceeded over 10-year, 30-year, and 50-year periods. Finally, the model results show the conditional non-exceedance probability or the likelihood that a target stage will not be exceeded by the 10% ACE (10 year), the 4% ACE (25-year), the 2% ACE (50-year), the 1% ACE (100-year), the 0.4% ACE (250-year), and the 0.2% ACE (500-year). Tables 73 and 74 display the project performance results for each study area reach for the base year, 2020, and the last year in the 50-year period of analysis, 2070, under without-project and with-project conditions.

Table of Tables
West Shore Lake Pontchartrain, LA Feasibility Study

Title	Table Number
Land Use in the Study Area	Table 1
Historical and Projected Parish Population	Table 2
Existing Condition and Projected Population within Inventoried Study Area	Table 3
Number of Households by Parish	Table 4
Per Capita Income	Table 5
Total Non-Farm Employment	Table 6
FEMA Flood Claims in Lousiana	Table 7
FEMA Flood Claims by Parish	Table 8
Number of Structures per Reach in the Existing Condition	Table 9
Residential and Non-Residential Structure Inventory	Table 10
Number of Projected Residential and Nonresidential Structures	Table 11
Content-to-Structure Value Ratios (CSVRs) and Standard Deviations (SDs)	Table 12
Depth-Damage Relationships for Structures, Contents and Vehicles	Table 13
Structures Damaged by Probability Event in 2020 and 2070 Intermediate Sea Level Rise	Table 14
Damages by Probability Event in 2020 and 2070	Table 15
Equivalent Annual Damage by FRM Compoment	Table 16
Equivalent Annual Damages for Recommended Plan	Table 17
Total Annual Costs, OMRR&R and Net Benefits at 3.5% and 7% Federal Discount Rate	Tables 18-61 C
Impact Region Pofile and Summary of Impacts	Table 62
Level of Risk Reduction Optimization	Tables 63-65
Sensitivity Analysis Without Future Development 3.5% and 7% Federal Discount Rate	Tables 66-69 E
Sensitivity Analysis for Sea-Level Rise	Tables 70-71
Risk Analysis Probability of Positive Net Benefits	Table 72
Risk Analysis Project Performance	Tables 73-74

Table 1
West Shore Lake Pontchartrain, LA Feasibility Study
Land Use in the Study Area
(2009)

Land Class Name	Acres	Percentage of Total
Developed land	10,947	4.7
Agricultural Land	23,779	10.3
Undeveloped Land	124,181	53.9
Open Water	71,576	31.1
Total	230,483	100.0

Source: National Agricultural Statistical Service

Note: Sugarcane accounts for approximately half of the agricultural land and pasture/hay the remainder.

Table 2
Historical and Projected Parish Population
West Shore Lake Pontchartrain, LA Feasibility Study
(1,000s)

Parish	1980	1990	2000	2010	2020	2080
St. Charles	37.5	42.5	48.2	52.8	56.2	65.5
St. James	21.6	20.8	21.4	22.1	22.3	26.5
St. John the Baptist	32.3	40.1	43.1	45.9	51.7	60.2
Total	91.4	103.4	112.7	120.8	130.2	152.1

Source: U.S. Census data, and Moody's County Forecast Database

Table 3

Existing Condition and Projected Population within
Inventoried Study Area

West Shore Lake Pontchartrain, LA Feasibility Study
(1,000s)

Parish	2012	2020	2070
Total in Study Area	62.90	64.7	95.9

Source: U.S. Census data, and Moody's County Forecast Database

Note: Population estimates in 2012 assumes 2.9 residents per housing unit and 20 housing units within a multi family structure.

Table 4
Number of Households by Parish
West Shore Lake Pontchartrain, LA Feasibility Study
(1,000s)

Parish	1980	1990	2000	2010	2020	2080
St. Charles	11.6	14.4	16.5	17.2	18.3	22.0
St. James	6.1	6.4	7.0	6.9	7.2	8.7
St. John the Baptist	9.4	12.7	14.3	15.1	16.3	19.6
Total	27.1	33.5	37.8	39.2	41.8	50.2

Source: U.S. Census data, and Moody's County Forecast Database

Table 5
Per Capita Income ($s)
West Shore Lake Pontchartrain, LA Feasibility Study

Parish	1990	2000	2005	2010	2012
St. Charles	17,297	24,228	26,826	32,599	34,992
St. John the Baptist	14,231	18,327	22,951	29,663	31,492
St. James	14,440	19,720	24,715	29,351	31,349

Source: U.S. Census data, and Moody's County Forecast Database

Table 6
Total Non-Farm Employment
West Shore Lake Pontchartrain, LA Feasibility Study
(1,000s)

Parish	1970	1980	1990	2000	2010	2020	2080
St. Charles	9.0	18.1	18.5	20.1	24.3	26.3	36.2
St. John the Baptist	5.4	9.8	9.4	7.6	8.1	8.9	11.5
St. James	4.2	9.4	11.0	13.4	15.0	16.3	22.4
Total	18.5	37.2	39.0	41.1	47.4	51.5	70.1

Source: U.S. Census data, and Moody's County Forecast Database

Table 7
FEMA Flood Claims in Louisiana
West Shore Lake Pontchartrain, LA Feasibility Study

Event	Year	Number of Paid Claims	Total Amount Paid (1,000s)	Average Amount Paid (1,000s)
Tropical Storm Juan	Oct-85	6,187	$ 189,842	$ 30.7
Hurricane Andrew	Aug-92	5,589	$ 270,791	$ 48.5
Tropical Storm Isadore	Sep-02	8,441	$ 141,869	$ 16.8
Hurricane Lili	Oct-02	2,563	$ 46,049	$ 18.0
Hurricane Katrina	Aug-05	167,099	$ 18,556,254	$ 111.0
Hurricane Rita	Sep-05	9,507	$ 539,086	$ 56.7
Hurricane Gustav	Sep-08	4,524	$ 115,250	$ 25.5
Hurricane Ike	Sep-08	46,137	$ 2,712,969	$ 58.8

Source: Federal Emergency Management Agency (FEMA)
Note: Total amount paid and average amount paid have been updated to the Oct 2011 price level using the CPI for all urban consumers.

Table 8
FEMA Flood Claims by Parish
1978-2011
West Shore Lake Pontchartrain, LA Feasibility Study

Parish	Number of Claims December 2012	Total Nominal Dollar Amount (in millions)	Average Dollar Amount per Claim (in thousands)
St. Charles	5907	$ 100.13	$ 16.95
St. James	135	$ 1.74	$ 12.87
St. John the Baptist	3840	$ 236.18	$ 61.51
Total	9882	$ 338.05	$ 34.21

Source: FEMA
Note: Average dollar amount for total claims due to Hurricane Isaac is approximately $125,000.

Table 9
Number of Structures in the Existing Condition
(2012)
West Shore Lake Pontchartrain, LA Feasibility Study

Reach Name	Residential	Mobile Home	Non-Residential	Vehicle	Total
Total	18,470	1,488	1,882	33,564	55,404

Table 10
Residential and Non-Residential Structure Inventory
Existing Conditions (2012)
West Shore Lake Pontchartrain, LA Feasibility Study
(2012 price levels in $1,000s)

Structure Category	Number	Average Depreciated Replacement Value
Residential		
One-Story Slab	11,532	$ 156
One-Story Pier	4,551	$ 88
Two-Story Slab	2,236	$ 186
Two-Story Pier	151	$ 171
Mobile Home	1,488	$ 14
Total Residential	**19,958**	
Eating and Recreation	128	$ 223
Professional	310	$ 646
Public and Semi-Public	402	$ 967
Repair and Home Use	74	$ 158
Retail and Personal Services	258	$ 368
Warehouse	543	$ 249
Grocery and Gas Station	78	$ 286
Multi-Family Occupancy	86	$ 307
Industrial	3	$ 2,568
Total Non-Residential	**1,882**	

Table 11
Number of Projected Residential and Non-Residential Structures
West Shore Lake Pontchartrain, LA Feasibility Study

Future Conditions (2020)	
Structure Category	Number
Residential	
One-Story Slab	312
One-Story Pier	63
Two-Story Slab	23
Two-Story Pier	5
Mobile Home	162
Total Residential	**565**
Non-Residential	
Eating and Recreation	11
Professional	27
Public and Semi-Public	32
Repair and Home Use	5
Retail and Personal Services	18
Warehouse	48
Grocery and Gas Station	5
Multi-Family Occupancy	3
Industrial	0
Total Non-Residential	**149**
Future Conditions (2070)	
Structure Category	Number
Residential	
One-Story Slab	5,745
One-Story Pier	1,206
Two-Story Slab	394
Two-Story Pier	91
Mobile Home	2,992
Total Residential	**10,428**
Non-Residential	
Eating and Recreation	54
Professional	120
Public and Semi-Public	133
Repair and Home Use	30
Retail and Personal Services	85
Warehouse	217
Grocery and Gas Station	23
Multi-Family Occupancy	17
Industrial	0
Total Non-Residential	**679**

Table 12

Content-to-Structure Value Ratios (CSVRs) and Standard Deviations (SDs)
by Structure Category
West Shore Lake Pontchartrain, LA Feasibility Study

Structure Category		(CSVR, SD)	Bootstrapped (CSVR,SD)
Residential	One-story	(0.69, 0.37)	(0.69, 0.37)
	Two-story	(0.67, 0.35)	(0.67, 0.35)
	Mobile home	(01.14, 0.79)	(1.14, 0.79)
Non-Residential	Eating and Recreation	(1.70, 3.27)	(1.70, 2.93)
	Groceries and Gas Stations	(1.34, 0.80)	(1.34, 0.78)
	Professional Buildings	(0.54, 0.59)	(0.54, 0.54)
	Public and Semi-Public Buildings	(0.55, 0.90)	(0.55, 0.80)
	Multi-Family Buildings	(0.28, 0.17)	(0.28, 0.17)
	Repair and Home Use	(2.36, 3.20)	(2.36, 2.95)
	Retail and Personal Services	(1.19, 1.11)	(1.19, 1.05)
	Warehouses and Contractor Services	(2.07, 3.66)	(2.07. 3.25)

Table 13
Depth-Damage Relationships for Structures, Contents, and Vehicles

West Shore Lake Pontchartrain, LA Feasibility Study

Occupancy Type	Category Name	Damage Type	Parameter																				
1STY-PIER	Residential		Stage	-1.1	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
		Structure	Mean %	0.0	4.0	5.4	20.5	62.4	62.4	64.0	65.6	65.6	68.7	71.9	71.9	71.9	71.9	84.4	84.4	84.4	84.4	84.4	84.4	84.4
			Lower %	0.0	1.5	1.5	7.5	40.5	41.5	41.6	44.7	44.7	44.7	46.3	46.3	46.3	46.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0
			Upper %	0.0	9.5	9.5	33.5	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	94.0	100.0	100.0	100.0	100.0	100.0	100.0
		Contents	Mean %	0.0	0.0	0.0	0.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
			Lower %	0.0	0.0	0.0	0.0	54.6	60.9	65.6	73.9	75.7	81.8	82.4	84.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0
			Upper %	0.0	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1STY-SLAB	Residential		Stage	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	
		Structure	Mean %	0.0	0.0	0.0	7.2	56.4	56.4	58.7	58.7	58.7	63.4	66.4	66.4	66.4	66.4	82.1	82.1	82.1	82.1	82.1	82.1	
			Lower %	0.0	0.0	0.0	0.0	36.5	36.5	38.0	38.0	38.0	41.0	61.0	61.0	61.0	61.0	75.4	75.4	75.4	75.4	75.4	75.4	
			Upper %	0.0	0.0	9.5	14.5	63.4	63.4	66.0	66.0	66.0	71.3	72.5	72.5	72.5	72.5	100.0	100.0	100.0	100.0	100.0	100.0	
		Contents	Mean %	0.0	0.0	0.0	0.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	
			Lower %	0.0	0.0	0.0	0.0	54.6	60.9	65.6	73.9	75.7	81.8	82.4	84.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	
			Upper %	0.0	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
2STY-PIER	Residential		Stage	-1.1	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
		Structure	Mean %	0.0	4.0	4.7	17.5	53.6	53.6	54.4	55.2	55.2	56.8	59.9	59.9	59.9	63.1	71.2	72.8	72.8	74.4	74.4	74.4	74.4
			Lower %	0.0	1.1	1.3	6.4	38.7	38.7	39.3	39.8	39.8	41.0	43.3	43.3	43.3	43.3	45.6	51.4	68.5	68.5	70.0	70.0	70.0
			Upper %	0.0	7.9	8.1	28.6	67.0	67.0	68.0	69.0	69.0	70.9	74.9	74.9	74.9	74.9	78.8	89.0	89.0	89.0	89.0	89.0	89.0
		Contents	Mean %	0.0	0.0	0.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	95.0	95.0	95.0	95.0	95.0	
			Lower %	0.0	0.0	0.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	90.0	90.0	90.0	90.0	90.0	
			Upper %	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
2STY-SLAB	Residential		Stage	-1.1	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
		Structure	Mean %	0.0	4.0	4.7	17.5	53.6	53.6	54.4	55.2	55.2	56.8	59.9	59.9	59.9	63.1	71.2	72.8	72.8	74.4	74.4	74.4	74.4
			Lower %	0.0	1.1	1.3	6.4	38.7	38.7	39.3	39.8	39.8	41.0	43.3	43.3	43.3	43.3	45.6	51.4	68.5	68.5	70.0	70.0	70.0
			Upper %	0.0	7.9	8.1	28.6	67.0	67.0	68.0	69.0	69.0	70.9	74.9	74.9	74.9	74.9	78.8	89.0	89.0	89.0	89.0	89.0	89.0
			Stage	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	
		Contents	Mean %	0.0	0.0	0.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	95.0	95.0	95.0	95.0	95.0	
			Lower %	0.0	0.0	0.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	90.0	90.0	90.0	90.0	90.0	
			Upper %	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
AUTO	AUTO		Stage	0.0	0.5	1.0	1.5	2.0	3.0															
		Structure	Mean %	0.0	2.3	22.8	54.2	95.8	100.0															
			Lower %	0.0	0.0	2.0	50.0	75.0	100.0															
			Upper %	0.0	5.0	50.0	75.0	100.0	100.0															

Table 13 (Cont)
Depth-Damage Relationships for Structures, Contents and Vehicles

Occupancy T	Category Nar	Damage Typ	Parameter																				
EAT	COM		Stage	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	
		Structure	Mean %	0.0	0.0	3.5	36.5	36.8	36.8	41.1	41.1	48.5	48.5	48.5	49.5	49.5	65.0	65.0	72.5	75.0	77.8	77.8	77.8	
			Lower %	0.0	0.0	0.0	24.3	28.6	29.4	32.0	33.6	41.5	42.0	42.0	42.9	44.3	59.3	59.7	66.5	68.8	74.7	75.7	75.7	
			Upper %	0.0	0.0	7.0	41.0	41.3	41.3	46.1	46.1	54.5	58.2	58.2	58.2	58.2	79.2	79.2	88.3	91.4	94.8	94.8	94.8	
		Contents	Mean %	0.0	0.0	0.0	61.6	82.6	87.3	88.4	93.3	93.5	93.5	93.5	93.5	99.3	99.3	99.3	99.3	99.3	99.3	99.3	99.3	
			Lower %	0.0	0.0	0.0	41.6	62.6	67.3	68.4	73.3	73.5	73.5	73.5	73.5	79.3	79.3	79.3	79.3	79.3	79.3	79.3	79.3	
			Upper %	0.0	0.0	0.0	81.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
GROC	COM		Stage	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	
		Structure	Mean %	0.0	0.0	3.5	36.5	36.8	36.8	41.1	41.1	48.5	48.5	48.5	49.5	49.5	65.0	65.0	72.5	75.0	77.8	77.8	77.8	
			Lower %	0.0	0.0	0.0	24.3	28.6	29.4	32.0	33.6	41.5	42.0	42.0	42.9	44.3	59.3	59.7	66.5	68.8	74.7	75.7	75.7	
			Upper %	0.0	0.0	7.0	41.0	41.3	41.3	46.1	46.1	54.5	58.2	58.2	58.2	58.2	79.2	79.2	88.3	91.4	94.8	94.8	94.8	
		Contents	Mean %	0.0	0.0	0.0	82.5	97.5	97.8	99.1	99.4	99.7	99.7	99.7	99.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
			Lower %	0.0	0.0	0.0	77.5	92.5	9.3	94.1	94.4	94.7	94.7	94.7	94.7	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	
			Upper %	0.0	0.0	0.0	87.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
MOBHOM	MOBHOME		Stage	-1.1	-1.0	-0.5	0.0	0.5	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	
		Structure	Mean %	0.0	12.1	12.1	32.1	62.1	63.8	64.2	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	
			Lower %	0.0	10.1	10.9	29.6	57.4	59.3	59.7	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	
			Upper %	0.0	13.4	15.1	34.6	66.8	68.3	68.7	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	
		Contents	Mean %	0.0	0.0	0.0	0.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	
			Lower %	0.0	0.0	0.0	0.0	47.5	52.0	59.6	73.7	77.6	88.8	89.1	89.4	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	
			Upper %	0.0	0.0	0.0	0.0	95.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
MULT	COM		Stage	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	
		Structure	Mean %	0.0	0.0	3.5	36.5	36.8	36.8	41.1	41.1	48.5	48.5	48.5	49.5	49.5	65.0	65.0	72.5	75.0	77.8	77.8	77.8	
			Lower %	0.0	0.0	0.0	24.3	28.6	29.4	32.0	33.6	41.5	42.0	42.0	42.9	44.3	59.3	59.7	66.5	68.8	74.7	75.7	75.7	
			Upper %	0.0	0.0	7.0	41.0	41.3	41.3	46.1	46.1	54.5	58.2	58.2	58.2	58.2	79.2	79.2	88.3	91.4	94.8	94.8	94.8	
		Contents	Mean %	0.0	0.0	0.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	100.0	100.0	100.0	100.0	100.0	
			Lower %	0.0	0.0	0.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	80.0	80.0	80.0	80.0	80.0	
			Upper %	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
PROF	COM		Stage	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	
		Structure	Mean %	0.0	0.0	3.5	36.5	36.8	36.8	41.1	41.1	48.5	48.5	48.5	49.5	49.5	65.0	65.0	72.5	75.0	77.8	77.8	77.8	
			Lower %	0.0	0.0	0.0	24.3	28.6	29.4	32.0	33.6	41.5	42.0	42.0	42.9	44.3	59.3	59.7	66.5	68.8	74.7	75.7	75.7	
			Upper %	0.0	0.0	7.0	41.0	41.3	41.3	46.1	46.1	54.5	58.2	58.2	58.2	58.2	79.2	79.2	88.3	91.4	94.8	94.8	94.8	
		Contents	Mean %	0.0	0.0	0.0	98.5	98.5	98.5	98.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
			Lower %	0.0	0.0	0.0	78.5	78.5	78.5	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	
			Upper %	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

Table 13 (Cont)
Depth-Damage Relationships for Structures, Contents and Vehicles
Morganza to the Gulf of Mexico, LA
Post-Authorization Change Report

PUBL	COM		Stage	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
		Structure	Mean %	0.0	0.0	3.5	36.5	36.8	36.8	41.1	41.1	48.5	48.5	48.5	49.5	49.5	65.0	65.0	72.5	75.0	77.8	77.8	77.8
			Lower %	0.0	0.0	0.0	24.3	28.6	29.4	32.0	33.6	41.5	42.0	42.0	42.9	44.3	59.3	59.7	66.5	68.8	74.7	75.7	75.7
			Upper %	0.0	0.0	7.0	41.0	41.3	41.3	46.1	46.1	54.5	58.2	58.2	58.2	58.2	79.2	79.2	88.3	91.4	94.8	94.8	94.8
		Contents	Mean %	0.0	0.0	0.0	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	100.0	100.0	100.0	100.0	100.0	100.0
			Lower %	0.0	0.0	0.0	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	85.0	85.0	85.0	85.0	85.0	85.0
			Upper %	0.0	0.0	0.0	75.2	75.2	75.2	75.2	75.2	75.2	75.2	75.2	75.2	75.2	75.2	100.0	100.0	100.0	100.0	100.0	100.0
REPA	COM		Stage	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
		Structure	Mean %	0.0	0.0	3.5	36.5	36.8	36.8	41.1	41.1	48.5	48.5	48.5	49.5	49.5	65.0	65.0	72.5	75.0	77.8	77.8	77.8
			Lower %	0.0	0.0	0.0	24.3	28.6	29.4	32.0	33.6	41.5	42.0	42.0	42.9	44.3	59.3	59.7	66.5	68.8	74.7	75.7	75.7
			Upper %	0.0	0.0	7.0	41.0	41.3	41.3	46.1	46.1	54.5	58.2	58.2	58.2	58.2	79.2	79.2	88.3	91.4	94.8	94.8	94.8
		Contents	Mean %	0.0	0.0	0.0	87.5	87.5	87.5	87.5	98.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
			Lower %	0.0	0.0	0.0	67.5	67.5	67.5	67.5	78.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
			Upper %	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
RETA	COM		Stage	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
		Structure	Mean %	0.0	0.0	3.5	36.5	36.8	36.8	41.1	41.1	48.5	48.5	48.5	49.5	49.5	65.0	65.0	72.5	75.0	77.8	77.8	77.8
			Lower %	0.0	0.0	0.0	24.3	28.6	29.4	32.0	33.6	41.5	42.0	42.0	42.9	44.3	59.3	59.7	66.5	68.8	74.7	75.7	75.7
			Upper %	0.0	0.0	7.0	41.0	41.3	41.3	46.1	46.1	54.5	58.2	58.2	58.2	58.2	79.2	79.2	88.3	91.4	94.8	94.8	94.8
			Stage	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
		Contents	Mean %	0.0	0.0	0.0	99.4	99.5	99.7	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
			Lower %	0.0	0.0	0.0	79.4	79.5	79.7	79.8	79.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
			Upper %	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
WARE	COM		Stage	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
		Structure	Mean %	0.0	0.0	3.5	36.5	36.8	36.8	41.1	41.1	48.5	48.5	48.5	49.5	49.5	65.0	65.0	72.5	75.0	77.8	77.8	77.8
			Lower %	0.0	0.0	0.0	24.3	28.6	29.4	32.0	33.6	41.5	42.0	42.0	42.9	44.3	59.3	59.7	66.5	68.8	74.7	75.7	75.7
			Upper %	0.0	0.0	7.0	41.0	41.3	41.3	46.1	46.1	54.5	58.2	58.2	58.2	58.2	79.2	79.2	88.3	91.4	94.8	94.8	94.8
			Stage	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
		Contents	Mean %	0.0	0.0	0.0	36.1	53.0	61.5	69.9	79.5	96.3	97.0	97.0	97.0	97.0	97.0	97.0	97.0	97.0	97.0	97.0	97.0
			Lower %	0.0	0.0	0.0	1.1	18.0	26.5	34.9	44.5	61.3	62.0	62.0	62.0	62.0	62.0	62.0	62.0	62.0	62.0	62.0	62.0
			Upper %	0.0	0.0	0.0	71.1	88.0	96.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Based on*Depth-Damage Relationships for Structures, Contents, and Vehicles and Content-to-Structure Value Ratios (CSVRs) in Support of the Lower Atchafalaya and Morganza to the Gulf, Louisiana, Feasibility Study Final Report* dated May 1997

Table 14

Structures Damaged by Probability Event in 2020 and 2070 Intermediate Sea Level Rise
Residential, Non-Residential, Mobile Homes and Industrial
Existing and Future Without-Project Conditions
West Shore Lake Pontchartrain, LA Feasibility Study

Annual Chance Exceedance Event (ACE)	Residential	Non-Residential	Mobile Home	IND	Total
Base year 2020					
0.99 (1 yr)	-	-	-	-	-
0.20 (5 yr)	-	-	-	-	-
0.10 (10 yr)	89	30	26	-	145
0.04 (25 yr)	558	117	98	-	773
0.02 (50 yr)	4,313	323	271	1	4,908
0.01 (100 yr)	6,942	647	523	2	8,114
0.005 (200 yr)	8,440	822	595	2	9,859
0.002 (500 yr)	9,170	1,014	672	2	10,858
Future year 2070 Intermediate Sea Level Rise					
0.99 (1 yr)	19	21	-	-	40
0.20 (5 yr)	258	48	56	-	362
0.10 (10 yr)	1,705	234	231	2	2,172
0.04 (25 yr)	4,486	400	420	2	5,308
0.02 (50 yr)	12,316	1,128	826	2	14,272
0.01 (100 yr)	19,381	2,032	1,037	2	22,452
0.005 (200 yr)	21,273	2,212	1,173	2	24,660
0.002 (500 yr)	23,037	2,446	1,241	2	26,726

Table 15

Damages By Probability Event in 2020 and 2070 Intermediate Sea Level Rise
Residential, Non-Residential, Mobile Homes and Industrial
Existing and Future Without-Project Conditions
West Shore Lake Pontchartrain, LA Feasibility Study
(Damages in $1,000s using 2012 Price Levels)

Annual Chance Exceedance Event (ACE)	Residential	Non-Residential	Mobile Home	IND	Total
Base year 2020					
0.99 (1 yr)	$ -	$ -	$ -	$ -	$ -
0.20 (5 yr)	-	-	-	-	-
0.10 (10 yr)	805	1,315	47	-	2,168
0.04 (25 yr)	45,685	17,621	452	-	63,758
0.02 (50 yr)	492,044	112,847	3,744	10	608,645
0.01 (100 yr)	1,060,300	177,277	6,767	344	1,244,688
0.005 (200 yr)	1,428,436	402,940	11,242	685	1,843,303
0.002 (500 yr)	1,634,417	526,761	13,299	885	2,175,362
Future year 2070 Intermediate Sea Level Rise					
0.99 (1 yr)	93	37	-	-	130
0.20 (5 yr)	9,025	1,030	149	-	10,204
0.10 (10 yr)	154,128	59,334	1,502	130	215,094
0.04 (25 yr)	472,488	117,001	3,748	587	593,825
0.02 (50 yr)	1,741,939	642,685	15,150	1,732	2,401,506
0.01 (100 yr)	2,966,925	1,492,510	21,187	1,829	4,482,451
0.005 (200 yr)	3,687,303	1,766,872	24,871	1,829	5,480,875
0.002 (500 yr)	4,059,892	2,067,546	28,044	1,829	6,157,311

Note: 2012 price levels were used for the damages.

Table 16
West Shore Lake Pontchartrain, LA Feasibility Study
Flood Risk Management (FRM) System by Component
(Damages in $1,000s in 2012 and 2014 Price Levels)

FRM Component	Equiv Annual Without Project Damages 2012 Prices (2020-2070)	Equiv Annual With-Project Damages 2012 Prices (2020-2070)	Equiv Annual Benefits 2012 Prices (2020-2070)	Equiv Annual Benefits 2014 Prices (2020-2070)
0.01 AEP (100-year) Level of Risk Reduction Structural System	$ 177,193	$ 91,832	$ 85,146	$ 87,700
Berm 1	$ 2,110	$ 1,069	$ 1,042	$ 1,073
Berm 2	$ 905	$ 683	$ 222	$ 229
Berm 3	$ 1,419	$ 491	$ 928	$ 956
Installation of Flap Gates on Culverts	$ 3,677	$ 2,590	$ 1,087	$ 1,119
Structure Raising outside of Levee Alignment and Berms	$ 2,411	$ 187	$ 2,223	$ 2,290

Note: Separate HEC-FDA model runs are made for each Flood Risk Management component.
Inducements of $215,110 attributed to the 0.01 AEP Level of Risk Reduction Structural System are included in the analysis.

Table 17
West Shore Lake Pontchartrain, LA Feasibility Study
Recommended Plan
(Damages in $1,000s)

Reach	Equiv Annual W/O Project Damages 2012 Prices (2020-2070)	Equiv Annual With-Project Damages 2012 Prices (2020-2070)	Equiv Annual Benefits 2012 Prices (2020-2070)	Equiv Annual Benefits 2014 Prices (2020-2070)
1	$ 1,300.8	$ 368.3	$ 932.5	$ 960.5
10	$ 33.1	$ 35.6	$ (2.5)	$ (2.5)
11	$ 2,858.3	$ 424.9	$ 2,433.3	$ 2,506.3
12	$ 15.0	$ 16.5	$ (1.5)	$ (1.6)
13	$ -	$ -	$ -	$ -
14	$ -	$ -	$ -	$ -
15	$ 1.2	$ 1.3	$ (0.1)	$ (0.1)
16	$ 2.9	$ 2.8	$ 0.1	$ 0.1
17	$ -	$ -	$ -	$ -
18	$ -	$ -	$ -	$ -
19	$ -	$ -	$ -	$ -
2	$ 72.6	$ 8.3	$ 64.3	$ 66.2
20	$ -	$ -	$ -	$ -
21	$ 801.5	$ 111.5	$ 690.0	$ 710.7
22	$ -	$ -	$ -	$ -
23	$ -	$ -	$ -	$ -
24	$ 231.4	$ 4.3	$ 227.1	$ 233.9
25	$ 1.2	$ 1.3	$ (0.1)	$ (0.1)
26	$ 0.1	$ 0.1	$ -	$ -
27	$ -	$ -	$ -	$ -
28	$ -	$ -	$ -	$ -
29	$ -	$ -	$ -	$ -
3	$ 33.5	$ 36.2	$ (2.7)	$ (2.8)
30	$ 11.1	$ 12.1	$ (1.0)	$ (1.1)
31	$ -	$ -	$ -	$ -
32	$ -	$ -	$ -	$ -
33	$ 50.0	$ 3.8	$ 46.2	$ 47.6
34	$ -	$ -	$ -	$ -
35	$ -	$ -	$ -	$ -
36	$ 4.2	$ 3.1	$ 1.1	$ 1.1
37	$ 1.5	$ 1.6	$ (0.1)	$ (0.1)
38	$ -	$ -	$ -	$ -
39	$ 3.6	$ 3.8	$ (0.2)	$ (0.2)
4	$ -	$ -	$ -	$ -
40	$ 0.2	$ 0.2	$ (0.0)	$ (0.0)
41	$ -	$ -	$ -	$ -
42	$ 4.6	$ 5.0	$ (0.4)	$ (0.4)
43	$ 7.6	$ 8.0	$ (0.4)	$ (0.4)
44	$ 0.3	$ 0.3	$ (0.0)	$ (0.0)
45	$ -	$ -	$ -	$ -
46	$ 1,824.4	$ 898.3	$ 926.1	$ 953.9

Table 17 cont.
West Shore Lake Pontchartrain, LA Feasibility Study
Recommended Plan
(Damages in $1,000s)

Reach	Equiv Annual W/O Project Damages 2012 Prices (2020-2070)	Equiv Annual With-Project Damages 2012 Prices (2020-2070)	Equiv Annual Benefits 2012 Prices (2020-2070)	Equiv Annual Benefits 2014 Prices (2020-2070)
47	$ -	$ -	$ -	$ -
48	$ -	$ -	$ -	$ -
49	$ -	$ -	$ -	$ -
5	$ 0.1	$ 0.1	$ -	$ -
50	$ -	$ -	$ -	$ -
51	$ -	$ -	$ -	$ -
52	$ 8.4	$ 8.9	$ (0.6)	$ (0.6)
53	$ 430.9	$ 452.2	$ (21.2)	$ (21.9)
54	$ 765.9	$ 67.3	$ 698.6	$ 719.5
55	$ 1,109.3	$ 204.6	$ 904.7	$ 931.8
56	$ 641.7	$ 252.2	$ 389.5	$ 401.2
57	$ 28.9	$ 6.9	$ 21.9	$ 22.6
58	$ 216.1	$ 8.4	$ 207.7	$ 213.9
59	$ 50.3	$ 51.9	$ (1.6)	$ (1.6)
6	$ 83.1	$ 83.2	$ (0.2)	$ (0.2)
60	$ 854.4	$ 860.1	$ (5.6)	$ (5.8)
7	$ 4,537.5	$ 409.4	$ 4,128.1	$ 4,251.9
8	$ 1,909.3	$ 1,158.1	$ 751.2	$ 773.8
9	$ 49.7	$ 53.7	$ (4.0)	$ (4.1)
SA 1	$ 2,954.4	$ 2,151.4	$ 803.0	$ 827.1
SA 10	$ 3,551.6	$ 217.3	$ 3,334.3	$ 3,434.3
SA 11	$ 11.9	$ 0.2	$ 11.8	$ 12.1
SA 12	$ 1,303.1	$ 644.0	$ 659.1	$ 678.9
SA 13	$ 1,229.4	$ 156.6	$ 1,072.8	$ 1,105.0
SA 14	$ 53,512.0	$ 52,327.8	$ 1,184.1	$ 1,219.7
SA 15	$ 522.0	$ 279.5	$ 242.5	$ 249.8
SA 16	$ 2,223.8	$ 1,258.1	$ 965.6	$ 994.6
SA 17	$ -	$ -	$ -	$ -
SA 18	$ 84.2	$ 2.4	$ 81.8	$ 84.2
SA 19	$ 1.7	$ -	$ 1.7	$ 1.7
SA 2	$ 2,694.9	$ 2,154.8	$ 540.1	$ 556.3
SA 20	$ -	$ -	$ -	$ -
SA 21	$ 11,183.1	$ 4,279.4	$ 6,903.7	$ 7,110.8
SA 22	$ 1,176.0	$ 847.4	$ 328.6	$ 338.5
SA 23	$ 560.2	$ 118.4	$ 441.8	$ 455.1
SA 24	$ 1,107.4	$ 348.5	$ 759.0	$ 781.7
SA 25	$ 258.9	$ 139.4	$ 119.6	$ 123.1
SA 26	$ 13.7	$ 0.1	$ 13.6	$ 14.0
SA 27	$ 2,093.1	$ 61.4	$ 2,031.6	$ 2,092.6
SA 28X	$ 1,154.5	$ 6.4	$ 1,148.1	$ 1,182.5
SA 28Y	$ 609.2	$ 6.9	$ 602.3	$ 620.4
SA 29	$ 4,646.7	$ 14.9	$ 4,631.8	$ 4,770.7
SA 29C	$ 632.6	$ 434.0	$ 198.6	$ 204.5
SA 3	$ 2,834.5	$ 2,814.9	$ 19.6	$ 20.2
SA 30	$ 6,269.7	$ 190.5	$ 6,079.2	$ 6,261.6
SA 30C	$ 971.5	$ 3.0	$ 968.5	$ 997.5
SA 31	$ 7,408.5	$ 17.7	$ 7,390.8	$ 7,612.5
SA 31C	$ -	$ -	$ -	$ -
SA 32	$ 10,827.0	$ 119.8	$ 10,707.3	$ 11,028.5

Table 17 cont.
West Shore Lake Pontchartrain, LA Feasibility Study
Recommended Plan
(Damages in $1,000s)

Reach	Equiv Annual W/O Project Damages 2012 Prices (2020-2070)	Equiv Annual With-Project Damages 2012 Prices (2020-2070)	Equiv Annual Benefits 2012 Prices (2020-2070)	Equiv Annual Benefits 2014 Prices (2020-2070)
SA 33	$ 8,869.9	$ 312.6	$ 8,557.3	$ 8,814.0
SA 34	$ 9,979.4	$ 819.2	$ 9,160.2	$ 9,435.0
SA 35	$ 2,673.2	$ 40.6	$ 2,632.5	$ 2,711.5
SA 36	$ 1,448.9	$ 0.6	$ 1,448.4	$ 1,491.8
SA 37	$ 0.7	$ -	$ 0.7	$ 0.7
SA 38	$ 4,194.3	$ 26.9	$ 4,167.4	$ 4,292.4
SA 39	$ 136.8	$ 0.1	$ 136.7	$ 140.8
SA 39C	$ 146.4	$ -	$ 146.4	$ 150.8
SA 4	$ 15,585.9	$ 15,142.9	$ 443.0	$ 456.3
SA 40P	$ 46.7	$ 0.7	$ 46.0	$ 47.4
SA 41	$ 890.5	$ 2.2	$ 888.3	$ 915.0
SA 41P	$ 6.6	$ 0.0	$ 6.6	$ 6.8
SA 42P	$ 3.7	$ -	$ 3.7	$ 3.8
SA 43P	$ -	$ -	$ -	$ -
SA 44C	$ -	$ -	$ -	$ -
SA 5	$ 345.0	$ 260.3	$ 84.6	$ 87.2
SA 6	$ 2,915.6	$ 2,863.8	$ 51.8	$ 53.4
SA 7	$ 807.7	$ 393.2	$ 414.6	$ 427.0
SA 8	$ 792.2	$ 66.2	$ 726.0	$ 747.8
SA 9	$ 2,489.0	$ 650.4	$ 1,838.7	$ 1,893.9
Total	$ 189,112.1	$ 94,738.1	$ 94,373.9	$ 97,205.2

Note: Future development is included in St. John Parish but not in St. James Parish.
Recommended Plan excludes Berm 2.

Table 18
Average Annual Costs

Hurricane Protection Levee
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4	58,669	1.1475	67,324
2016	-3	124,713	1.1087	138,271
2017	-2	124,713	1.0712	133,595
2018	-1	124,713	1.0350	129,078
2019	0	124,713	1.0000	124,713
2020	1	-	0.9662	-
2021	2	-	0.9335	-
2022	3	-	0.9019	-
2023	4	-	0.8714	-
2024	5	-	0.8420	-
2025	6	-	0.8135	-
2026	7	7,441	0.7860	5,849
2027	8	7,441	0.7594	5,651
2028	9	-	0.7337	-
2029	10	17,008	0.7089	12,057
2030	11	8,504	0.6849	5,825
2031	12	8,504	0.6618	5,628
2032	13	-	0.6394	-
2033	14	-	0.6178	-
2034	15	-	0.5969	-
2035	16	-	0.5767	-
2036	17	-	0.5572	-
2037	18	-	0.5384	-
2038	19	-	0.5202	-
2039	20	-	0.5026	-
2040	21	-	0.4856	-
2041	22	-	0.4692	-
2042	23	-	0.4533	-
2043	24	-	0.4380	-
2044	25	-	0.4231	-
2045	26	19,284	0.4088	7,884
2046	27	9,642	0.3950	3,809
2047	28	9,642	0.3817	3,680
2048	29	-	0.3687	-
2049	30	-	0.3563	-
2050	31	-	0.3442	-
2051	32	-	0.3326	-
2052	33	-	0.3213	-
2053	34	-	0.3105	-
2054	35	-	0.3000	-
2055	36	-	0.2898	-
2056	37	-	0.2800	-
2057	38	-	0.2706	-
2058	39	-	0.2614	-
2059	40	-	0.2526	-
2060	41	15,807	0.2440	3,857
2061	42	7,904	0.2358	1,863
2062	43	7,904	0.2278	1,800
2063	44	-	0.2201	-
2064	45	-	0.2127	-
2065	46	-	0.2055	-
2066	47	-	0.1985	-
2067	48	-	0.1918	-
2068	49	-	0.1853	-
2069	50	-	0.1791	-
Total:		676,598		650,883

FY 2014 Federal Discount Rate:		3.50%	
Amortization Factor:		0.04263	
Average Annual Construction Costs:			$ 27,750
Annual OMRR&R Costs:			4,374
Total Average Annual Costs:			$ 32,124

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 19
Average Annual Costs

Berm 1
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.1475	-
2016	-3		1.1087	-
2017	-2		1.0712	-
2018	-1	7140	1.0350	7,390
2019	0	7140	1.0000	7,140
2020	1		0.9662	-
2021	2		0.9335	-
2022	3		0.9019	-
2023	4		0.8714	-
2024	5		0.8420	-
2025	6		0.8135	-
2026	7		0.7860	-
2027	8		0.7594	-
2028	9		0.7337	-
2029	10		0.7089	-
2030	11		0.6849	-
2031	12		0.6618	-
2032	13		0.6394	-
2033	14		0.6178	-
2034	15		0.5969	-
2035	16		0.5767	-
2036	17		0.5572	-
2037	18		0.5384	-
2038	19		0.5202	-
2039	20		0.5026	-
2040	21		0.4856	-
2041	22		0.4692	-
2042	23		0.4533	-
2043	24		0.4380	-
2044	25		0.4231	-
2045	26		0.4088	-
2046	27		0.3950	-
2047	28		0.3817	-
2048	29		0.3687	-
2049	30		0.3563	-
2050	31		0.3442	-
2051	32		0.3326	-
2052	33		0.3213	-
2053	34		0.3105	-
2054	35		0.3000	-
2055	36		0.2898	-
2056	37		0.2800	-
2057	38		0.2706	-
2058	39		0.2614	-
2059	40		0.2526	-
2060	41		0.2440	-
2061	42		0.2358	-
2062	43		0.2278	-
2063	44		0.2201	-
2064	45		0.2127	-
2065	46		0.2055	-
2066	47		0.1985	-
2067	48		0.1918	-
2068	49		0.1853	-
2069	50		0.1791	-
Total:		14,280		14,530

FY 2014 Federal Discount Rate:		3.50%	
Amortization Factor:		0.04263	
Average Annual Construction Costs:			$ 619
Annual OMRR&R Costs:			223
Total Average Annual Costs:			$ 842

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 20
Average Annual Costs

Berm 2
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.1475	-
2016	-3		1.1087	-
2017	-2		1.0712	-
2018	-1	8972	1.0350	9,286
2019	0	8972	1.0000	8,972
2020	1		0.9662	-
2021	2		0.9335	-
2022	3		0.9019	-
2023	4		0.8714	-
2024	5		0.8420	-
2025	6		0.8135	-
2026	7		0.7860	-
2027	8		0.7594	-
2028	9		0.7337	-
2029	10		0.7089	-
2030	11		0.6849	-
2031	12		0.6618	-
2032	13		0.6394	-
2033	14		0.6178	-
2034	15		0.5969	-
2035	16		0.5767	-
2036	17		0.5572	-
2037	18		0.5384	-
2038	19		0.5202	-
2039	20		0.5026	-
2040	21		0.4856	-
2041	22		0.4692	-
2042	23		0.4533	-
2043	24		0.4380	-
2044	25		0.4231	-
2045	26		0.4088	-
2046	27		0.3950	-
2047	28		0.3817	-
2048	29		0.3687	-
2049	30		0.3563	-
2050	31		0.3442	-
2051	32		0.3326	-
2052	33		0.3213	-
2053	34		0.3105	-
2054	35		0.3000	-
2055	36		0.2898	-
2056	37		0.2800	-
2057	38		0.2706	-
2058	39		0.2614	-
2059	40		0.2526	-
2060	41		0.2440	-
2061	42		0.2358	-
2062	43		0.2278	-
2063	44		0.2201	-
2064	45		0.2127	-
2065	46		0.2055	-
2066	47		0.1985	-
2067	48		0.1918	-
2068	49		0.1853	-
2069	50		0.1791	-
Total:		17,943		18,257

FY 2014 Federal Discount Rate:	3.50%		
Amortization Factor:	0.04263		
Average Annual Construction Costs:		$	778
Annual OMRR&R Costs:			278
Total Average Annual Costs:		$	1,057

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 21
Average Annual Costs

Berm 3
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.1475	-
2016	-3		1.1087	-
2017	-2		1.0712	-
2018	-1	7109	1.0350	7,358
2019	0	7109	1.0000	7,109
2020	1		0.9662	-
2021	2		0.9335	-
2022	3		0.9019	-
2023	4		0.8714	-
2024	5		0.8420	-
2025	6		0.8135	-
2026	7		0.7860	-
2027	8		0.7594	-
2028	9		0.7337	-
2029	10		0.7089	-
2030	11		0.6849	-
2031	12		0.6618	-
2032	13		0.6394	-
2033	14		0.6178	-
2034	15		0.5969	-
2035	16		0.5767	-
2036	17		0.5572	-
2037	18		0.5384	-
2038	19		0.5202	-
2039	20		0.5026	-
2040	21		0.4856	-
2041	22		0.4692	-
2042	23		0.4533	-
2043	24		0.4380	-
2044	25		0.4231	-
2045	26		0.4088	-
2046	27		0.3950	-
2047	28		0.3817	-
2048	29		0.3687	-
2049	30		0.3563	-
2050	31		0.3442	-
2051	32		0.3326	-
2052	33		0.3213	-
2053	34		0.3105	-
2054	35		0.3000	-
2055	36		0.2898	-
2056	37		0.2800	-
2057	38		0.2706	-
2058	39		0.2614	-
2059	40		0.2526	-
2060	41		0.2440	-
2061	42		0.2358	-
2062	43		0.2278	-
2063	44		0.2201	-
2064	45		0.2127	-
2065	46		0.2055	-
2066	47		0.1985	-
2067	48		0.1918	-
2068	49		0.1853	-
2069	50		0.1791	-
Total:		14,218		14,467

FY 2014 Federal Discount Rate:	3.50%		
Amortization Factor:	0.04263		
Average Annual Construction Costs:		$	617
Annual OMRR&R Costs:			223
Total Average Annual Costs:		$	839

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 22
Average Annual Costs

Installation of Flap Gates on Culverts
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.1475	-
2016	-3		1.1087	-
2017	-2		1.0712	-
2018	-1	2995	1.0350	3,100
2019	0	2995	1.0000	2,995
2020	1		0.9662	-
2021	2		0.9335	-
2022	3		0.9019	-
2023	4		0.8714	-
2024	5		0.8420	-
2025	6		0.8135	-
2026	7		0.7860	-
2027	8		0.7594	-
2028	9		0.7337	-
2029	10		0.7089	-
2030	11		0.6849	-
2031	12		0.6618	-
2032	13		0.6394	-
2033	14		0.6178	-
2034	15		0.5969	-
2035	16		0.5767	-
2036	17		0.5572	-
2037	18		0.5384	-
2038	19		0.5202	-
2039	20		0.5026	-
2040	21		0.4856	-
2041	22		0.4692	-
2042	23		0.4533	-
2043	24		0.4380	-
2044	25		0.4231	-
2045	26		0.4088	-
2046	27		0.3950	-
2047	28		0.3817	-
2048	29		0.3687	-
2049	30		0.3563	-
2050	31		0.3442	-
2051	32		0.3326	-
2052	33		0.3213	-
2053	34		0.3105	-
2054	35		0.3000	-
2055	36		0.2898	-
2056	37		0.2800	-
2057	38		0.2706	-
2058	39		0.2614	-
2059	40		0.2526	-
2060	41		0.2440	-
2061	42		0.2358	-
2062	43		0.2278	-
2063	44		0.2201	-
2064	45		0.2127	-
2065	46		0.2055	-
2066	47		0.1985	-
2067	48		0.1918	-
2068	49		0.1853	-
2069	50		0.1791	-
Total:		5,990		6,094

FY 2014 Federal Discount Rate:	3.50%	
Amortization Factor:	0.04263	
Average Annual Construction Costs:		$ 260
Annual OMRR&R Costs:		204
Total Average Annual Costs:		$ 464

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 23
Average Annual Costs

Other Localized Storm Surge Risk Reduction Measures
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.1475	-
2016	-3		1.1087	-
2017	-2		1.0712	-
2018	-1		1.0350	-
2019	0	7005	1.0000	7,005
2020	1		0.9662	-
2021	2		0.9335	-
2022	3		0.9019	-
2023	4		0.8714	-
2024	5		0.8420	-
2025	6		0.8135	-
2026	7		0.7860	-
2027	8		0.7594	-
2028	9		0.7337	-
2029	10		0.7089	-
2030	11		0.6849	-
2031	12		0.6618	-
2032	13		0.6394	-
2033	14		0.6178	-
2034	15		0.5969	-
2035	16		0.5767	-
2036	17		0.5572	-
2037	18		0.5384	-
2038	19		0.5202	-
2039	20		0.5026	-
2040	21		0.4856	-
2041	22		0.4692	-
2042	23		0.4533	-
2043	24		0.4380	-
2044	25		0.4231	-
2045	26		0.4088	-
2046	27		0.3950	-
2047	28		0.3817	-
2048	29		0.3687	-
2049	30		0.3563	-
2050	31		0.3442	-
2051	32		0.3326	-
2052	33		0.3213	-
2053	34		0.3105	-
2054	35		0.3000	-
2055	36		0.2898	-
2056	37		0.2800	-
2057	38		0.2706	-
2058	39		0.2614	-
2059	40		0.2526	-
2060	41		0.2440	-
2061	42		0.2358	-
2062	43		0.2278	-
2063	44		0.2201	-
2064	45		0.2127	-
2065	46		0.2055	-
2066	47		0.1985	-
2067	48		0.1918	-
2068	49		0.1853	-
2069	50		0.1791	-
Total:		7,005		7,005

FY 2014 Federal Discount Rate:	3.50%	
Amortization Factor:	0.04263	
Average Annual Construction Costs:		$ 299
Annual OMRR&R Costs:		0
Total Average Annual Costs:		$ 299

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 24 A
Average Annual Costs
1% AEP (100-year) Levee Alignment Alternative C including all Localized Storm Surge Risk Reduction Measures
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4	58,669	1.1475	67,324
2016	-3	124,713	1.1087	138,271
2017	-2	124,713	1.0712	133,595
2018	-1	150,928	1.0350	156,211
2019	0	157,933	1.0000	157,933
2020	1	-	0.9662	-
2021	2	-	0.9335	-
2022	3	-	0.9019	-
2023	4	-	0.8714	-
2024	5	-	0.8420	-
2025	6	-	0.8135	-
2026	7	7,441	0.7860	5,849
2027	8	7,441	0.7594	5,651
2028	9	-	0.7337	-
2029	10	17,008	0.7089	12,057
2030	11	8,504	0.6849	5,825
2031	12	8,504	0.6618	5,628
2032	13	-	0.6394	-
2033	14	-	0.6178	-
2034	15	-	0.5969	-
2035	16	-	0.5767	-
2036	17	-	0.5572	-
2037	18	-	0.5384	-
2038	19	-	0.5202	-
2039	20	-	0.5026	-
2040	21	-	0.4856	-
2041	22	-	0.4692	-
2042	23	-	0.4533	-
2043	24	-	0.4380	-
2044	25	-	0.4231	-
2045	26	19,284	0.4088	7,884
2046	27	9,642	0.3950	3,809
2047	28	9,642	0.3817	3,680
2048	29	-	0.3687	-
2049	30	-	0.3563	-
2050	31	-	0.3442	-
2051	32	-	0.3326	-
2052	33	-	0.3213	-
2053	34	-	0.3105	-
2054	35	-	0.3000	-
2055	36	-	0.2898	-
2056	37	-	0.2800	-
2057	38	-	0.2706	-
2058	39	-	0.2614	-
2059	40	-	0.2526	-
2060	41	15,807	0.2440	3,857
2061	42	7,904	0.2358	1,863
2062	43	7,904	0.2278	1,800
2063	44	-	0.2201	-
2064	45	-	0.2127	-
2065	46	-	0.2055	-
2066	47	-	0.1985	-
2067	48	-	0.1918	-
2068	49	-	0.1853	-
2069	50	-	0.1791	-
Total:		736,034		711,237

FY 2014 Federal Discount Rate:	3.50%	
Amortization Factor:	0.04263	
Average Annual Construction Costs:		$ 30,323
Annual OMRR&R Costs:		5,302
Total Average Annual Costs:		$ 35,625

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 24 B
Average Annual Costs
1% AEP (100-year) Levee Alignment Alternative C including all Localized Storm Surge Risk Reduction Measures Except Berm 2
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4	58,669	1.1475	67,324
2016	-3	124,713	1.1087	138,271
2017	-2	124,713	1.0712	133,595
2018	-1	141,957	1.0350	146,925
2019	0	148,962	1.0000	148,962
2020	1	-	0.9662	-
2021	2	-	0.9335	-
2022	3	-	0.9019	-
2023	4	-	0.8714	-
2024	5	-	0.8420	-
2025	6	-	0.8135	-
2026	7	7,441	0.7860	5,849
2027	8	7,441	0.7594	5,651
2028	9	-	0.7337	-
2029	10	17,008	0.7089	12,057
2030	11	8,504	0.6849	5,825
2031	12	8,504	0.6618	5,628
2032	13	-	0.6394	-
2033	14	-	0.6178	-
2034	15	-	0.5969	-
2035	16	-	0.5767	-
2036	17	-	0.5572	-
2037	18	-	0.5384	-
2038	19	-	0.5202	-
2039	20	-	0.5026	-
2040	21	-	0.4856	-
2041	22	-	0.4692	-
2042	23	-	0.4533	-
2043	24	-	0.4380	-
2044	25	-	0.4231	-
2045	26	19,284	0.4088	7,884
2046	27	9,642	0.3950	3,809
2047	28	9,642	0.3817	3,680
2048	29	-	0.3687	-
2049	30	-	0.3563	-
2050	31	-	0.3442	-
2051	32	-	0.3326	-
2052	33	-	0.3213	-
2053	34	-	0.3105	-
2054	35	-	0.3000	-
2055	36	-	0.2898	-
2056	37	-	0.2800	-
2057	38	-	0.2706	-
2058	39	-	0.2614	-
2059	40	-	0.2526	-
2060	41	15,807	0.2440	3,857
2061	42	7,904	0.2358	1,863
2062	43	7,904	0.2278	1,800
2063	44	-	0.2201	-
2064	45	-	0.2127	-
2065	46	-	0.2055	-
2066	47	-	0.1985	-
2067	48	-	0.1918	-
2068	49	-	0.1853	-
2069	50	-	0.1791	-
Total:		718,091		692,980

FY 2014 Federal Discount Rate:	3.50%	
Amortization Factor:	0.04263	
Average Annual Construction Costs:		$ 29,544
Annual OMRR&R Costs:		5,023
Total Average Annual Costs:		$ 34,568

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 24 C
Average Annual Costs
1% AEP (100-year) Levee Alignment Alternative C including all Localized Storm Surge Risk Reduction Measures Except Berm 2
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4	58,669	1.1420	66,999
2016	-3	124,713	1.1047	137,771
2017	-2	124,713	1.0686	133,273
2018	-1	141,957	1.0338	146,748
2019	0	148,962	1.0000	148,962
2020	1	-	0.9674	-
2021	2	-	0.9358	-
2022	3	-	0.9052	-
2023	4	-	0.8757	-
2024	5	-	0.8471	-
2025	6	-	0.8194	-
2026	7	7,441	0.7927	5,898
2027	8	7,441	0.7668	5,706
2028	9	-	0.7418	-
2029	10	17,008	0.7175	12,204
2030	11	8,504	0.6941	5,903
2031	12	8,504	0.6715	5,710
2032	13	-	0.6495	-
2033	14	-	0.6283	-
2034	15	-	0.6078	-
2035	16	-	0.5880	-
2036	17	-	0.5688	-
2037	18	-	0.5502	-
2038	19	-	0.5322	-
2039	20	-	0.5149	-
2040	21	-	0.4981	-
2041	22	-	0.4818	-
2042	23	-	0.4661	-
2043	24	-	0.4508	-
2044	25	-	0.4361	-
2045	26	19,284	0.4219	8,135
2046	27	9,642	0.4081	3,935
2047	28	9,642	0.3948	3,806
2048	29	-	0.3819	-
2049	30	-	0.3694	-
2050	31	-	0.3574	-
2051	32	-	0.3457	-
2052	33	-	0.3344	-
2053	34	-	0.3235	-
2054	35	-	0.3129	-
2055	36	-	0.3027	-
2056	37	-	0.2928	-
2057	38	-	0.2833	-
2058	39	-	0.2740	-
2059	40	-	0.2651	-
2060	41	15,807	0.2564	4,053
2061	42	7,904	0.2481	1,961
2062	43	7,904	0.2400	1,896
2063	44	-	0.2321	-
2064	45	-	0.2245	-
2065	46	-	0.2172	-
2066	47	-	0.2101	-
2067	48	-	0.2033	-
2068	49	-	0.1966	-
2069	50	-	0.1902	-
Total:		718,091		692,960

FY 2015 Federal Discount Rate:		3.375%	
Amortization Factor:		0.04168	
Average Annual Construction Costs:			$ 28,881
Annual OMRR&R Costs:			5,070
Total Average Annual Costs:			$ 33,951

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 25
Average Annual Costs

Hurricane Protection Levee
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.1475	-
2016	-3	0	1.1087	-
2017	-2	0	1.0712	-
2018	-1	0	1.0350	-
2019	0	0	1.0000	-
2020	1	50	0.9662	48
2021	2	1558	0.9335	1,454
2022	3	1558	0.9019	1,405
2023	4	3377	0.8714	2,943
2024	5	1558	0.8420	1,311
2025	6	2737	0.8135	2,226
2026	7	3567	0.7860	2,803
2027	8	1890	0.7594	1,436
2028	9	1558	0.7337	1,143
2029	10	4377	0.7089	3,103
2030	11	4723	0.6849	3,235
2031	12	1964	0.6618	1,300
2032	13	3409	0.6394	2,180
2033	14	2474	0.6178	1,528
2034	15	1558	0.5969	930
2035	16	4857	0.5767	2,801
2036	17	1737	0.5572	968
2037	18	2474	0.5384	1,332
2038	19	3377	0.5202	1,757
2039	20	2037	0.5026	1,024
2040	21	5146	0.4856	2,499
2041	22	4389	0.4692	2,059
2042	23	1599	0.4533	725
2043	24	1858	0.4380	814
2044	25	3377	0.4231	1,429
2045	26	33213	0.4088	13,579
2046	27	1653	0.3950	653
2047	28	3719	0.3817	1,420
2048	29	1558	0.3687	574
2049	30	2474	0.3563	881
2050	31	36781	0.3442	12,661
2051	32	1954	0.3326	650
2052	33	1599	0.3213	514
2053	34	4293	0.3105	1,333
2054	35	1558	0.3000	467
2055	36	10038	0.2898	2,909
2056	37	12833	0.2800	3,594
2057	38	2389	0.2706	646
2058	39	1685	0.2614	440
2059	40	3843	0.2526	971
2060	41	5146	0.2440	1,256
2061	42	2457	0.2358	579
2062	43	3532	0.2278	805
2063	44	1858	0.2201	409
2064	45	1558	0.2127	331
2065	46	5345	0.2055	1,098
2066	47	1667	0.1985	331
2067	48	2043	0.1918	392
2068	49	3377	0.1853	626
2069	50	72782	0.1791	13,032
Total:		286,561		102,603

FY 2014 Federal Discount Rate:	3.50%	
Amortization Factor:	0.04263	
Average Annual OMRR&R Costs:		$ 4,374

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 26
Average Annual Costs

Berm 1
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.1475	-
2016	-3		1.1087	-
2017	-2		1.0712	-
2018	-1		1.0350	-
2019	0		1.0000	-
2020	1	64	0.9662	62
2021	2	64	0.9335	60
2022	3	221	0.9019	199
2023	4	64	0.8714	56
2024	5	147	0.8420	124
2025	6	221	0.8135	180
2026	7	64	0.7860	50
2027	8	64	0.7594	49
2028	9	221	0.7337	162
2029	10	264	0.7089	187
2030	11	64	0.6849	44
2031	12	221	0.6618	146
2032	13	64	0.6394	41
2033	14	64	0.6178	40
2034	15	305	0.5969	182
2035	16	64	0.5767	37
2036	17	64	0.5572	36
2037	18	221	0.5384	119
2038	19	64	0.5202	33
2039	20	288	0.5026	145
2040	21	221	0.4856	107
2041	22	64	0.4692	30
2042	23	64	0.4533	29
2043	24	221	0.4380	97
2044	25	320	0.4231	135
2045	26	64	0.4088	26
2046	27	221	0.3950	87
2047	28	64	0.3817	24
2048	29	64	0.3687	24
2049	30	2579	0.3563	919
2050	31	64	0.3442	22
2051	32	64	0.3326	21
2052	33	221	0.3213	71
2053	34	64	0.3105	20
2054	35	1827	0.3000	548
2055	36	221	0.2898	64
2056	37	64	0.2800	18
2057	38	64	0.2706	17
2058	39	221	0.2614	58
2059	40	288	0.2526	73
2060	41	64	0.2440	16
2061	42	221	0.2358	52
2062	43	64	0.2278	15
2063	44	64	0.2201	14
2064	45	305	0.2127	65
2065	46	64	0.2055	13
2066	47	64	0.1985	13
2067	48	221	0.1918	42
2068	49	64	0.1853	12
2069	50	3567	0.1791	639
Total:		14,491		5,222

FY 2014 Federal Discount Rate:	3.50%	
Amortization Factor:	0.04263	
Average Annual OMRR&R Costs:		$ 223

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 27
Average Annual Costs

Berm 2
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.1475	-
2016	-3		1.1087	-
2017	-2		1.0712	-
2018	-1		1.0350	-
2019	0		1.0000	-
2020	1	80	0.9662	77
2021	2	80	0.9335	75
2022	3	277	0.9019	250
2023	4	80	0.8714	70
2024	5	184	0.8420	155
2025	6	277	0.8135	225
2026	7	80	0.7860	63
2027	8	80	0.7594	61
2028	9	277	0.7337	203
2029	10	330	0.7089	234
2030	11	80	0.6849	55
2031	12	277	0.6618	183
2032	13	80	0.6394	51
2033	14	80	0.6178	49
2034	15	381	0.5969	227
2035	16	80	0.5767	46
2036	17	80	0.5572	45
2037	18	277	0.5384	149
2038	19	80	0.5202	42
2039	20	359	0.5026	180
2040	21	277	0.4856	135
2041	22	80	0.4692	38
2042	23	80	0.4533	36
2043	24	277	0.4380	121
2044	25	400	0.4231	169
2045	26	80	0.4088	33
2046	27	277	0.3950	109
2047	28	80	0.3817	31
2048	29	80	0.3687	29
2049	30	3224	0.3563	1,149
2050	31	80	0.3442	28
2051	32	80	0.3326	27
2052	33	277	0.3213	89
2053	34	80	0.3105	25
2054	35	2284	0.3000	685
2055	36	277	0.2898	80
2056	37	80	0.2800	22
2057	38	80	0.2706	22
2058	39	277	0.2614	72
2059	40	359	0.2526	91
2060	41	80	0.2440	20
2061	42	277	0.2358	65
2062	43	80	0.2278	18
2063	44	80	0.2201	18
2064	45	381	0.2127	81
2065	46	80	0.2055	16
2066	47	80	0.1985	16
2067	48	277	0.1918	53
2068	49	80	0.1853	15
2069	50	4459	0.1791	798
Total:		18,122		6,531

FY 2014 Federal Discount Rate:	3.50%	
Amortization Factor:	0.04263	
Average Annual OMRR&R Costs:		$ 278

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Note: Berm 2 is an integral component of the recommended plan but is not a justified increment that comprises the NED Plan. Refer to the NED Plan section of the economic appendix.

Table 28
Average Annual Costs

Berm 3
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.1475	-
2016	-3		1.1087	-
2017	-2		1.0712	-
2018	-1		1.0350	-
2019	0		1.0000	-
2020	1	64	0.9662	62
2021	2	64	0.9335	60
2022	3	221	0.9019	199
2023	4	64	0.8714	56
2024	5	147	0.8420	124
2025	6	221	0.8135	180
2026	7	64	0.7860	50
2027	8	64	0.7594	49
2028	9	221	0.7337	162
2029	10	264	0.7089	187
2030	11	64	0.6849	44
2031	12	221	0.6618	146
2032	13	64	0.6394	41
2033	14	64	0.6178	40
2034	15	305	0.5969	182
2035	16	64	0.5767	37
2036	17	64	0.5572	36
2037	18	221	0.5384	119
2038	19	64	0.5202	33
2039	20	288	0.5026	145
2040	21	221	0.4856	107
2041	22	64	0.4692	30
2042	23	64	0.4533	29
2043	24	221	0.4380	97
2044	25	320	0.4231	135
2045	26	64	0.4088	26
2046	27	221	0.3950	87
2047	28	64	0.3817	24
2048	29	64	0.3687	24
2049	30	2,579	0.3563	919
2050	31	64	0.3442	22
2051	32	64	0.3326	21
2052	33	221	0.3213	71
2053	34	64	0.3105	20
2054	35	1,827	0.3000	548
2055	36	221	0.2898	64
2056	37	64	0.2800	18
2057	38	64	0.2706	17
2058	39	221	0.2614	58
2059	40	288	0.2526	73
2060	41	64	0.2440	16
2061	42	221	0.2358	52
2062	43	64	0.2278	15
2063	44	64	0.2201	14
2064	45	305	0.2127	65
2065	46	64	0.2055	13
2066	47	64	0.1985	13
2067	48	221	0.1918	42
2068	49	64	0.1853	12
2069	50	3,567	0.1791	639
Total:		14,491		5,222

FY 2014 Federal Discount Rate:	3.50%	
Amortization Factor:	0.04263	
Average Annual OMRR&R Costs:		$ 223

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 29
Average Annual Costs

Installation of Flap Gates on Culverts
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.1475	-
2016	-3		1.1087	-
2017	-2		1.0712	-
2018	-1		1.0350	-
2019	0		1.0000	-
2020	1	58	0.9662	56
2021	2	58	0.9335	54
2022	3	203	0.9019	183
2023	4	58	0.8714	51
2024	5	135	0.8420	114
2025	6	203	0.8135	165
2026	7	58	0.7860	46
2027	8	58	0.7594	44
2028	9	203	0.7337	149
2029	10	242	0.7089	172
2030	11	58	0.6849	40
2031	12	203	0.6618	134
2032	13	58	0.6394	37
2033	14	58	0.6178	36
2034	15	280	0.5969	167
2035	16	58	0.5767	33
2036	17	58	0.5572	32
2037	18	203	0.5384	109
2038	19	58	0.5202	30
2039	20	264	0.5026	133
2040	21	203	0.4856	99
2041	22	58	0.4692	27
2042	23	58	0.4533	26
2043	24	203	0.4380	89
2044	25	293	0.4231	124
2045	26	58	0.4088	24
2046	27	203	0.3950	80
2047	28	58	0.3817	22
2048	29	58	0.3687	21
2049	30	2,364	0.3563	842
2050	31	58	0.3442	20
2051	32	58	0.3326	19
2052	33	203	0.3213	65
2053	34	58	0.3105	18
2054	35	1,675	0.3000	502
2055	36	203	0.2898	59
2056	37	58	0.2800	16
2057	38	58	0.2706	16
2058	39	203	0.2614	53
2059	40	264	0.2526	67
2060	41	58	0.2440	14
2061	42	203	0.2358	48
2062	43	58	0.2278	13
2063	44	58	0.2201	13
2064	45	280	0.2127	60
2065	46	58	0.2055	12
2066	47	58	0.1985	12
2067	48	203	0.1918	39
2068	49	58	0.1853	11
2069	50	3,270	0.1791	586
Total:		13,272		4,781

FY 2014 Federal Discount Rate:	3.50%	
Amortization Factor:	0.04263	
Average Annual OMRR&R Costs:		$ 204

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 30
Average Annual Costs

Other Localized Storm Surge Risk Reduction Measures
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.1475	-
2016	-3		1.1087	-
2017	-2		1.0712	-
2018	-1		1.0350	-
2019	0		1.0000	-
2020	1	-	0.9662	-
2021	2	-	0.9335	-
2022	3	-	0.9019	-
2023	4	-	0.8714	-
2024	5	-	0.8420	-
2025	6	-	0.8135	-
2026	7	-	0.7860	-
2027	8	-	0.7594	-
2028	9	-	0.7337	-
2029	10	-	0.7089	-
2030	11	-	0.6849	-
2031	12	-	0.6618	-
2032	13	-	0.6394	-
2033	14	-	0.6178	-
2034	15	-	0.5969	-
2035	16	-	0.5767	-
2036	17	-	0.5572	-
2037	18	-	0.5384	-
2038	19	-	0.5202	-
2039	20	-	0.5026	-
2040	21	-	0.4856	-
2041	22	-	0.4692	-
2042	23	-	0.4533	-
2043	24	-	0.4380	-
2044	25	-	0.4231	-
2045	26	-	0.4088	-
2046	27	-	0.3950	-
2047	28	-	0.3817	-
2048	29	-	0.3687	-
2049	30	-	0.3563	-
2050	31	-	0.3442	-
2051	32	-	0.3326	-
2052	33	-	0.3213	-
2053	34	-	0.3105	-
2054	35	-	0.3000	-
2055	36	-	0.2898	-
2056	37	-	0.2800	-
2057	38	-	0.2706	-
2058	39	-	0.2614	-
2059	40	-	0.2526	-
2060	41	-	0.2440	-
2061	42	-	0.2358	-
2062	43	-	0.2278	-
2063	44	-	0.2201	-
2064	45	-	0.2127	-
2065	46	-	0.2055	-
2066	47	-	0.1985	-
2067	48	-	0.1918	-
2068	49	-	0.1853	-
2069	50	-	0.1791	-
Total:		-		-

FY 2014 Federal Discount Rate:	3.50%	
Amortization Factor:	0.04263	
Average Annual OMRR&R Costs:		$ -

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 31 A
Average Annual Costs
1% AEP (100-year) Levee Alignment Alternative C including all
Localized Storm Surge Risk Reduction Measures
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4	-	1.1475	-
2016	-3	-	1.1087	-
2017	-2	-	1.0712	-
2018	-1	-	1.0350	-
2019	0	-	1.0000	-
2020	1	316	0.9662	305
2021	2	1,824	0.9335	1,702
2022	3	2,480	0.9019	2,236
2023	4	3,643	0.8714	3,175
2024	5	2,171	0.8420	1,828
2025	6	3,659	0.8135	2,976
2026	7	3,833	0.7860	3,012
2027	8	2,156	0.7594	1,638
2028	9	2,480	0.7337	1,819
2029	10	5,477	0.7089	3,883
2030	11	4,989	0.6849	3,417
2031	12	2,886	0.6618	1,910
2032	13	3,675	0.6394	2,350
2033	14	2,740	0.6178	1,693
2034	15	2,829	0.5969	1,688
2035	16	5,123	0.5767	2,954
2036	17	2,003	0.5572	1,116
2037	18	3,396	0.5384	1,828
2038	19	3,643	0.5202	1,895
2039	20	3,236	0.5026	1,626
2040	21	6,068	0.4856	2,947
2041	22	4,655	0.4692	2,184
2042	23	1,865	0.4533	845
2043	24	2,780	0.4380	1,218
2044	25	4,710	0.4231	1,993
2045	26	33,479	0.4088	13,687
2046	27	2,575	0.3950	1,017
2047	28	3,985	0.3817	1,521
2048	29	1,824	0.3687	672
2049	30	13,220	0.3563	4,710
2050	31	37,047	0.3442	12,753
2051	32	2,220	0.3326	738
2052	33	2,521	0.3213	810
2053	34	4,559	0.3105	1,416
2054	35	9,171	0.3000	2,751
2055	36	10,960	0.2898	3,176
2056	37	13,099	0.2800	3,668
2057	38	2,655	0.2706	718
2058	39	2,607	0.2614	681
2059	40	5,042	0.2526	1,273
2060	41	5,412	0.2440	1,321
2061	42	3,379	0.2358	797
2062	43	3,798	0.2278	865
2063	44	2,124	0.2201	468
2064	45	2,829	0.2127	602
2065	46	5,611	0.2055	1,153
2066	47	1,933	0.1985	384
2067	48	2,965	0.1918	569
2068	49	3,643	0.1853	675
2069	50	87,645	0.1791	15,693
Total:		346,937		124,358

FY 2014 Federal Discount Rate:	3.50%	
Amortization Factor:	0.04263	
Average Annual OMRR&R Costs:		$ 5,302

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 31 B
Average Annual Costs
1% AEP (100-year) Levee Alignment Alternative C including all
Localized Storm Surge Risk Reduction Measures Except Berm 2
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4	-	1.1475	-
2016	-3	-	1.1087	-
2017	-2	-	1.0712	-
2018	-1	-	1.0350	-
2019	0	-	1.0000	-
2020	1	236	0.9662	228
2021	2	1,744	0.9335	1,628
2022	3	2,203	0.9019	1,987
2023	4	3,563	0.8714	3,105
2024	5	1,987	0.8420	1,673
2025	6	3,382	0.8135	2,751
2026	7	3,753	0.7860	2,950
2027	8	2,076	0.7594	1,577
2028	9	2,203	0.7337	1,616
2029	10	5,147	0.7089	3,649
2030	11	4,909	0.6849	3,363
2031	12	2,609	0.6618	1,727
2032	13	3,595	0.6394	2,299
2033	14	2,660	0.6178	1,643
2034	15	2,448	0.5969	1,461
2035	16	5,043	0.5767	2,908
2036	17	1,923	0.5572	1,072
2037	18	3,119	0.5384	1,679
2038	19	3,563	0.5202	1,853
2039	20	2,877	0.5026	1,446
2040	21	5,791	0.4856	2,812
2041	22	4,575	0.4692	2,146
2042	23	1,785	0.4533	809
2043	24	2,503	0.4380	1,096
2044	25	4,310	0.4231	1,824
2045	26	33,399	0.4088	13,655
2046	27	2,298	0.3950	908
2047	28	3,905	0.3817	1,491
2048	29	1,744	0.3687	643
2049	30	9,996	0.3563	3,561
2050	31	36,967	0.3442	12,725
2051	32	2,140	0.3326	712
2052	33	2,244	0.3213	721
2053	34	4,479	0.3105	1,391
2054	35	6,887	0.3000	2,066
2055	36	10,683	0.2898	3,096
2056	37	13,019	0.2800	3,646
2057	38	2,575	0.2706	697
2058	39	2,330	0.2614	609
2059	40	4,683	0.2526	1,183
2060	41	5,332	0.2440	1,301
2061	42	3,102	0.2358	731
2062	43	3,718	0.2278	847
2063	44	2,044	0.2201	450
2064	45	2,448	0.2127	521
2065	46	5,531	0.2055	1,137
2066	47	1,853	0.1985	368
2067	48	2,688	0.1918	516
2068	49	3,563	0.1853	660
2069	50	83,186	0.1791	14,895
Total:		328,815		117,827

FY 2014 Federal Discount Rate:	3.50%	
Amortization Factor:	0.04263	
Average Annual OMRR&R Costs:		$ 5,023

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 31 C
Average Annual Costs
1% AEP (100-year) Levee Alignment Alternative C including all Localized Storm Surge Risk Reduction Measures Except Berm 2
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4	-	1.1420	-
2016	-3	-	1.1047	-
2017	-2	-	1.0686	-
2018	-1	-	1.0338	-
2019	0	-	1.0000	-
2020	1	236	0.9674	228
2021	2	1,744	0.9358	1,632
2022	3	2,203	0.9052	1,994
2023	4	3,563	0.8757	3,120
2024	5	1,987	0.8471	1,683
2025	6	3,382	0.8194	2,771
2026	7	3,753	0.7927	2,975
2027	8	2,076	0.7668	1,592
2028	9	2,203	0.7418	1,634
2029	10	5,147	0.7175	3,693
2030	11	4,909	0.6941	3,408
2031	12	2,609	0.6715	1,752
2032	13	3,595	0.6495	2,335
2033	14	2,660	0.6283	1,671
2034	15	2,448	0.6078	1,488
2035	16	5,043	0.5880	2,965
2036	17	1,923	0.5688	1,094
2037	18	3,119	0.5502	1,716
2038	19	3,563	0.5322	1,896
2039	20	2,877	0.5149	1,481
2040	21	5,791	0.4981	2,884
2041	22	4,575	0.4818	2,204
2042	23	1,785	0.4661	832
2043	24	2,503	0.4508	1,129
2044	25	4,310	0.4361	1,880
2045	26	33,399	0.4219	14,091
2046	27	2,298	0.4081	938
2047	28	3,905	0.3948	1,542
2048	29	1,744	0.3819	666
2049	30	9,996	0.3694	3,693
2050	31	36,967	0.3574	13,211
2051	32	2,140	0.3457	740
2052	33	2,244	0.3344	751
2053	34	4,479	0.3235	1,449
2054	35	6,887	0.3129	2,155
2055	36	10,683	0.3027	3,234
2056	37	13,019	0.2928	3,812
2057	38	2,575	0.2833	729
2058	39	2,330	0.2740	638
2059	40	4,683	0.2651	1,241
2060	41	5,332	0.2564	1,367
2061	42	3,102	0.2481	769
2062	43	3,718	0.2400	892
2063	44	2,044	0.2321	475
2064	45	2,448	0.2245	550
2065	46	5,531	0.2172	1,201
2066	47	1,853	0.2101	389
2067	48	2,688	0.2033	546
2068	49	3,563	0.1966	701
2069	50	83,186	0.1902	15,822
Total:		328,815		121,659

FY 2015 Federal Discount Rate:	3.375%	
Amortization Factor:	0.04168	
Average Annual OMRR&R Costs:		$ 5,070

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 32
1% AEP (100-year) Levee Alignment Alternative C
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages 2012 Prices (2020-2070)	Equiv Annual With-Project Damages 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 177,193	$ 91,832	$ 85,361	$ 87,922
First Costs				$ 676,598
Interest During Construction				$ 35,461
Annual Operation & Maintenance Costs				$ 4,374
Total Annual Costs			$ 31,160	$ 32,124
B/C Ratio			2.74	2.74
Equivalent Annual Net Benefits - 2020 Base Year			$ 54,201	$ 55,798

Table 33
Berm 1
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 2,110	$ 1,069	$ 1,042	$ 1,073
First Costs				$ 14,280
Interest During Construction				$ 250
Annual Operation & Maintenance Costs				$ 223
Total Annual Costs			$ 817	$ 842
B/C Ratio			1.28	1.27
Equivalent Annual Net Benefits - 2020 Base Year			$ 225	$ 231

Table 34
Berm 2
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 905	$ 683	$ 222	$ 229
First Costs				$ 17,943
Interest During Construction				$ 314
Annual Operation & Maintenance Costs				$ 278
Total Annual Costs			$ 1,025	$ 1,057
B/C Ratio			0.22	0.22
Equivalent Annual Net Benefits - 2020 Base Year			$ (803)	$ (828)

Table 35
Berm 3
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 1,419	$ 491	$ 928	$ 956
First Costs				$ 14,218
Interest During Construction				$ 249
Annual Operation & Maintenance Costs				$ 223
Total Annual Costs			$ 814	$ 839
B/C Ratio			1.14	1.14
Equivalent Annual Net Benefits - 2020 Base Year			$ 113	$ 116

Table 36
Installation of Flap Gates on Culverts
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 3,677	$ 2,590	$ 1,087	$ 1,119
First Costs				$ 5,990
Interest During Construction				$ 105
Annual Operation & Maintenance Costs				$ 204
Total Annual Costs			$ 450	$ 464
B/C Ratio			2.42	2.41
Equivalent Annual Net Benefits - 2020 Base Year			$ 637	$ 656

Table 37
Structure Raising outside of Berms and Levee
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 2,411	$ 187	$ 2,223	$ 2,290
First Costs				$ 7,005
Interest During Construction				$ -
Annual Operation & Maintenance Costs				$ -
Total Annual Costs			$ 290	$ 299
B/C Ratio			7.68	7.67
Equivalent Annual Net Benefits - 2020 Base Year			$ 1,934	$ 1,991

Table 38 A
All of the Localized Storm Surge Risk Reduction Measures Outside of Levee Alignment
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 10,521	$ 5,020	$ 5,501	$ 5,666
First Costs				$ 59,436
Interest During Construction				$ 918
Annual Operation & Maintenance Costs				$ 928
Total Annual Costs			$ 3,396	$ 3,501
B/C Ratio			1.62	1.62
Equivalent Annual Net Benefits - 2020 Base Year			$ 2,106	$ 2,166

Note: Localized Storm Surge Risk Reduction measures outside of the levee alignment include the earthen berms, installation of flap gates on culverts and other localized Storm Surge Risk Reduction measures including structure raising and flood proofing.

Table 38 B
All of the Localized Storm Surge Risk Reduction Measures Outside of Levee Alignment Excluding Berm 2
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 9,617	$ 4,337	$ 5,279	$ 5,438
First Costs				$ 41,493
Interest During Construction				$ 604
Annual Operation & Maintenance Costs				$ 649
Total Annual Costs			$ 2,370	$ 2,444
B/C Ratio			2.23	2.23
Equivalent Annual Net Benefits - 2020 Base Year			$ 2,909	$ 2,994

Note: Localized Storm Surge Risk Reduction measures outside of the levee alignment include the earthen berms, installation of flap gates on culverts and other localized Storm Surge Risk Reduction measures including structure raising and flood proofing.

Table 39 A
1% AEP (100-year) Levee Alignment Alternative C Including All Localized Storm Surge Risk Reduction Measures
Summation of Separate HEC-FDA Model Executions
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 187,714	$ 96,852	$ 90,862	$ 93,588
First Costs				$ 736,034
Interest During Construction				$ 36,379
Annual Operation & Maintenance Costs				$ 5,302
Total Annual Costs			$ 34,556	$ 35,625
B/C Ratio			2.63	2.63
Equivalent Annual Net Benefits - 2020 Base Year			$ 56,306	$ 57,963

Note: Future Development is not included in St. James Parish

Table 39 B
Recommended Plan
1% AEP (100-year) Levee Alignment Alternative C Including All Localized Storm Surge Risk Reduction Measures Excluding Berm 2
Summation of Separate HEC-FDA Model Executions
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 186,809	$ 96,169	$ 90,640	$ 93,359
First Costs				$ 718,091
Interest During Construction				$ 36,065
Annual Operation & Maintenance Costs				$ 5,023
Total Annual Costs			$ 33,531	$ 34,568
B/C Ratio			2.70	2.70
Equivalent Annual Net Benefits - 2020 Base Year			$ 57,109	$ 58,791

Note: Future Development is not included in St. James Parish

Table 39 C
Recommended Plan
1% AEP (100-year) Levee Alignment Alternative C Including All Localized Storm Surge Risk Reduction Measures Excluding Berm 2
HEC-FDA Model Results for Combined Flood Risk Management System Components
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 189,112	$ 94,738	$ 94,374	$ 97,205
First Costs				$ 718,091
Interest During Construction				$ 36,065
Annual Operation & Maintenance Costs				$ 5,023
Total Annual Costs			$ 33,531	$ 34,568
B/C Ratio			2.81	2.81
Equivalent Annual Net Benefits - 2020 Base Year			$ 60,843	$ 62,637

Note: Future Development is not included in St. James Parish

Table 39 D
Recommended Plan
1% AEP (100-year) Levee Alignment Alternative C Including All Localized Storm Surge Risk Reduction Measures Excluding Berm 2
HEC-FDA Model Results for Combined Flood Risk Management System Components
(2012 and 2014 Price Levels; 3.375% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 189,785	$ 94,796	$ 94,990	$ 97,840
First Costs				$ 718,091
Interest During Construction				$ 34,740
Annual Operation & Maintenance Costs				$ 5,070
Total Annual Costs			$ 32,933	$ 33,951
B/C Ratio			2.88	2.88
Equivalent Annual Net Benefits - 2020 Base Year			$ 62,057	$ 63,888

Note: Future Development is not included in St. James Parish

Table 40
Average Annual Costs

Hurricane Protection Levee
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4	58,669	1.3108	76,903
2016	-3	124,713	1.2250	152,779
2017	-2	124,713	1.1449	142,784
2018	-1	124,713	1.0700	133,443
2019	0	124,713	1.0000	124,713
2020	1	-	0.9346	-
2021	2	-	0.8734	-
2022	3	-	0.8163	-
2023	4	-	0.7629	-
2024	5	-	0.7130	-
2025	6	-	0.6663	-
2026	7	7,441	0.6227	4,634
2027	8	7,441	0.5820	4,331
2028	9	-	0.5439	-
2029	10	17,008	0.5083	8,646
2030	11	8,504	0.4751	4,040
2031	12	8,504	0.4440	3,776
2032	13	-	0.4150	-
2033	14	-	0.3878	-
2034	15	-	0.3624	-
2035	16	-	0.3387	-
2036	17	-	0.3166	-
2037	18	-	0.2959	-
2038	19	-	0.2765	-
2039	20	-	0.2584	-
2040	21	-	0.2415	-
2041	22	-	0.2257	-
2042	23	-	0.2109	-
2043	24	-	0.1971	-
2044	25	-	0.1842	-
2045	26	19,284	0.1722	3,321
2046	27	9,642	0.1609	1,552
2047	28	9,642	0.1504	1,450
2048	29	-	0.1406	-
2049	30	-	0.1314	-
2050	31	-	0.1228	-
2051	32	-	0.1147	-
2052	33	-	0.1072	-
2053	34	-	0.1002	-
2054	35	-	0.0937	-
2055	36	-	0.0875	-
2056	37	-	0.0818	-
2057	38	-	0.0765	-
2058	39	-	0.0715	-
2059	40	-	0.0668	-
2060	41	15,807	0.0624	987
2061	42	7,904	0.0583	461
2062	43	7,904	0.0545	431
2063	44	-	0.0509	-
2064	45	-	0.0476	-
2065	46	-	0.0445	-
2066	47	-	0.0416	-
2067	48	-	0.0389	-
2068	49	-	0.0363	-
2069	50	-	0.0339	-
Total:		676,598		664,248

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual Construction Costs:		$ 48,131
Annual OMRR&R Costs:		178
Total Average Annual Costs:		$ 48,310

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 41
Average Annual Costs

Berm 1
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.3108	-
2016	-3		1.2250	-
2017	-2		1.1449	-
2018	-1	7140	1.0700	7,640
2019	0	7140	1.0000	7,140
2020	1		0.9346	-
2021	2		0.8734	-
2022	3		0.8163	-
2023	4		0.7629	-
2024	5		0.7130	-
2025	6		0.6663	-
2026	7		0.6227	-
2027	8		0.5820	-
2028	9		0.5439	-
2029	10		0.5083	-
2030	11		0.4751	-
2031	12		0.4440	-
2032	13		0.4150	-
2033	14		0.3878	-
2034	15		0.3624	-
2035	16		0.3387	-
2036	17		0.3166	-
2037	18		0.2959	-
2038	19		0.2765	-
2039	20		0.2584	-
2040	21		0.2415	-
2041	22		0.2257	-
2042	23		0.2109	-
2043	24		0.1971	-
2044	25		0.1842	-
2045	26		0.1722	-
2046	27		0.1609	-
2047	28		0.1504	-
2048	29		0.1406	-
2049	30		0.1314	-
2050	31		0.1228	-
2051	32		0.1147	-
2052	33		0.1072	-
2053	34		0.1002	-
2054	35		0.0937	-
2055	36		0.0875	-
2056	37		0.0818	-
2057	38		0.0765	-
2058	39		0.0715	-
2059	40		0.0668	-
2060	41		0.0624	-
2061	42		0.0583	-
2062	43		0.0545	-
2063	44		0.0509	-
2064	45		0.0476	-
2065	46		0.0445	-
2066	47		0.0416	-
2067	48		0.0389	-
2068	49		0.0363	-
2069	50		0.0339	-
Total:		14,280		14,780

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual Construction Costs:		$ 1,071
Annual OMRR&R Costs:		163
Total Average Annual Costs:		$ 1,234

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 42
Average Annual Costs

Berm 2
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.3108	-
2016	-3		1.2250	-
2017	-2		1.1449	-
2018	-1	8972	1.0700	9,600
2019	0	8972	1.0000	8,972
2020	1		0.9346	-
2021	2		0.8734	-
2022	3		0.8163	-
2023	4		0.7629	-
2024	5		0.7130	-
2025	6		0.6663	-
2026	7		0.6227	-
2027	8		0.5820	-
2028	9		0.5439	-
2029	10		0.5083	-
2030	11		0.4751	-
2031	12		0.4440	-
2032	13		0.4150	-
2033	14		0.3878	-
2034	15		0.3624	-
2035	16		0.3387	-
2036	17		0.3166	-
2037	18		0.2959	-
2038	19		0.2765	-
2039	20		0.2584	-
2040	21		0.2415	-
2041	22		0.2257	-
2042	23		0.2109	-
2043	24		0.1971	-
2044	25		0.1842	-
2045	26		0.1722	-
2046	27		0.1609	-
2047	28		0.1504	-
2048	29		0.1406	-
2049	30		0.1314	-
2050	31		0.1228	-
2051	32		0.1147	-
2052	33		0.1072	-
2053	34		0.1002	-
2054	35		0.0937	-
2055	36		0.0875	-
2056	37		0.0818	-
2057	38		0.0765	-
2058	39		0.0715	-
2059	40		0.0668	-
2060	41		0.0624	-
2061	42		0.0583	-
2062	43		0.0545	-
2063	44		0.0509	-
2064	45		0.0476	-
2065	46		0.0445	-
2066	47		0.0416	-
2067	48		0.0389	-
2068	49		0.0363	-
2069	50		0.0339	-
Total:		17,943		18,571

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual Construction Costs:		$ 1,346
Annual OMRR&R Costs:		223
Total Average Annual Costs:		$ 1,569

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 43
Average Annual Costs

Berm 3
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.3108	-
2016	-3		1.2250	-
2017	-2		1.1449	-
2018	-1	7109	1.0700	7,607
2019	0	7109	1.0000	7,109
2020	1		0.9346	-
2021	2		0.8734	-
2022	3		0.8163	-
2023	4		0.7629	-
2024	5		0.7130	-
2025	6		0.6663	-
2026	7		0.6227	-
2027	8		0.5820	-
2028	9		0.5439	-
2029	10		0.5083	-
2030	11		0.4751	-
2031	12		0.4440	-
2032	13		0.4150	-
2033	14		0.3878	-
2034	15		0.3624	-
2035	16		0.3387	-
2036	17		0.3166	-
2037	18		0.2959	-
2038	19		0.2765	-
2039	20		0.2584	-
2040	21		0.2415	-
2041	22		0.2257	-
2042	23		0.2109	-
2043	24		0.1971	-
2044	25		0.1842	-
2045	26		0.1722	-
2046	27		0.1609	-
2047	28		0.1504	-
2048	29		0.1406	-
2049	30		0.1314	-
2050	31		0.1228	-
2051	32		0.1147	-
2052	33		0.1072	-
2053	34		0.1002	-
2054	35		0.0937	-
2055	36		0.0875	-
2056	37		0.0818	-
2057	38		0.0765	-
2058	39		0.0715	-
2059	40		0.0668	-
2060	41		0.0624	-
2061	42		0.0583	-
2062	43		0.0545	-
2063	44		0.0509	-
2064	45		0.0476	-
2065	46		0.0445	-
2066	47		0.0416	-
2067	48		0.0389	-
2068	49		0.0363	-
2069	50		0.0339	-
Total:		14,218		14,716

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual Construction Costs:		$ 1,066
Annual OMRR&R Costs:		178
Total Average Annual Costs:		$ 1,245

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 44
Average Annual Costs

Installation of Flap Gates on Culverts
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.3108	-
2016	-3		1.2250	-
2017	-2		1.1449	-
2018	-1	2995	1.0700	3,204
2019	0	2995	1.0000	2,995
2020	1		0.9346	-
2021	2		0.8734	-
2022	3		0.8163	-
2023	4		0.7629	-
2024	5		0.7130	-
2025	6		0.6663	-
2026	7		0.6227	-
2027	8		0.5820	-
2028	9		0.5439	-
2029	10		0.5083	-
2030	11		0.4751	-
2031	12		0.4440	-
2032	13		0.4150	-
2033	14		0.3878	-
2034	15		0.3624	-
2035	16		0.3387	-
2036	17		0.3166	-
2037	18		0.2959	-
2038	19		0.2765	-
2039	20		0.2584	-
2040	21		0.2415	-
2041	22		0.2257	-
2042	23		0.2109	-
2043	24		0.1971	-
2044	25		0.1842	-
2045	26		0.1722	-
2046	27		0.1609	-
2047	28		0.1504	-
2048	29		0.1406	-
2049	30		0.1314	-
2050	31		0.1228	-
2051	32		0.1147	-
2052	33		0.1072	-
2053	34		0.1002	-
2054	35		0.0937	-
2055	36		0.0875	-
2056	37		0.0818	-
2057	38		0.0765	-
2058	39		0.0715	-
2059	40		0.0668	-
2060	41		0.0624	-
2061	42		0.0583	-
2062	43		0.0545	-
2063	44		0.0509	-
2064	45		0.0476	-
2065	46		0.0445	-
2066	47		0.0416	-
2067	48		0.0389	-
2068	49		0.0363	-
2069	50		0.0339	-
Total:		5,990		6,199

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual Construction Costs:		$ 449
Annual OMRR&R Costs:		163
Total Average Annual Costs:		$ 613

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 45
Average Annual Costs

Other Localized Storm Surge Risk Reduction Measures
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.3108	-
2016	-3		1.2250	-
2017	-2		1.1449	-
2018	-1		1.0700	-
2019	0	7005	1.0000	7,005
2020	1		0.9346	-
2021	2		0.8734	-
2022	3		0.8163	-
2023	4		0.7629	-
2024	5		0.7130	-
2025	6		0.6663	-
2026	7		0.6227	-
2027	8		0.5820	-
2028	9		0.5439	-
2029	10		0.5083	-
2030	11		0.4751	-
2031	12		0.4440	-
2032	13		0.4150	-
2033	14		0.3878	-
2034	15		0.3624	-
2035	16		0.3387	-
2036	17		0.3166	-
2037	18		0.2959	-
2038	19		0.2765	-
2039	20		0.2584	-
2040	21		0.2415	-
2041	22		0.2257	-
2042	23		0.2109	-
2043	24		0.1971	-
2044	25		0.1842	-
2045	26		0.1722	-
2046	27		0.1609	-
2047	28		0.1504	-
2048	29		0.1406	-
2049	30		0.1314	-
2050	31		0.1228	-
2051	32		0.1147	-
2052	33		0.1072	-
2053	34		0.1002	-
2054	35		0.0937	-
2055	36		0.0875	-
2056	37		0.0818	-
2057	38		0.0765	-
2058	39		0.0715	-
2059	40		0.0668	-
2060	41		0.0624	-
2061	42		0.0583	-
2062	43		0.0545	-
2063	44		0.0509	-
2064	45		0.0476	-
2065	46		0.0445	-
2066	47		0.0416	-
2067	48		0.0389	-
2068	49		0.0363	-
2069	50		0.0339	-
Total:		7,005		7,005

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual Construction Costs:		$ 508
Annual OMRR&R Costs:		0
Total Average Annual Costs:		$ 508

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 46 A
Average Annual Costs
1% AEP (100-year) Levee Alignment Alternative C including all Localized Storm Surge Risk Reduction Measures
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4	58,669	1.3108	76,903
2016	-3	124,713	1.2250	152,779
2017	-2	124,713	1.1449	142,784
2018	-1	150,928	1.0700	161,493
2019	0	157,933	1.0000	157,933
2020	1	-	0.9346	-
2021	2	-	0.8734	-
2022	3	-	0.8163	-
2023	4	-	0.7629	-
2024	5	-	0.7130	-
2025	6	-	0.6663	-
2026	7	7,441	0.6227	4,634
2027	8	7,441	0.5820	4,331
2028	9	-	0.5439	-
2029	10	17,008	0.5083	8,646
2030	11	8,504	0.4751	4,040
2031	12	8,504	0.4440	3,776
2032	13	-	0.4150	-
2033	14	-	0.3878	-
2034	15	-	0.3624	-
2035	16	-	0.3387	-
2036	17	-	0.3166	-
2037	18	-	0.2959	-
2038	19	-	0.2765	-
2039	20	-	0.2584	-
2040	21	-	0.2415	-
2041	22	-	0.2257	-
2042	23	-	0.2109	-
2043	24	-	0.1971	-
2044	25	-	0.1842	-
2045	26	19,284	0.1722	3,321
2046	27	9,642	0.1609	1,552
2047	28	9,642	0.1504	1,450
2048	29	-	0.1406	-
2049	30	-	0.1314	-
2050	31	-	0.1228	-
2051	32	-	0.1147	-
2052	33	-	0.1072	-
2053	34	-	0.1002	-
2054	35	-	0.0937	-
2055	36	-	0.0875	-
2056	37	-	0.0818	-
2057	38	-	0.0765	-
2058	39	-	0.0715	-
2059	40	-	0.0668	-
2060	41	15,807	0.0624	987
2061	42	7,904	0.0583	461
2062	43	7,904	0.0545	431
2063	44	-	0.0509	-
2064	45	-	0.0476	-
2065	46	-	0.0445	-
2066	47	-	0.0416	-
2067	48	-	0.0389	-
2068	49	-	0.0363	-
2069	50	-	0.0339	-
Total:		736,034		725,519

OMB Discount Rate:	0.0700	
Amortization Factor:	0.07246	
Average Annual Construction Costs:		52,571
Annual OMRR&R Costs:		4,182
Total Average Annual Costs:		56,753

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 46 B
Average Annual Costs
1% AEP (100-year) Levee Alignment Alternative C including all Localized Storm Surge Risk Reduction Measures Except Berm 2
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	Construction Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4	58,669	1.3108	76,903
2016	-3	124,713	1.2250	152,779
2017	-2	124,713	1.1449	142,784
2018	-1	141,957	1.0700	151,894
2019	0	148,962	1.0000	148,962
2020	1	-	0.9346	-
2021	2	-	0.8734	-
2022	3	-	0.8163	-
2023	4	-	0.7629	-
2024	5	-	0.7130	-
2025	6	-	0.6663	-
2026	7	7,441	0.6227	4,634
2027	8	7,441	0.5820	4,331
2028	9	-	0.5439	-
2029	10	17,008	0.5083	8,646
2030	11	8,504	0.4751	4,040
2031	12	8,504	0.4440	3,776
2032	13	-	0.4150	-
2033	14	-	0.3878	-
2034	15	-	0.3624	-
2035	16	-	0.3387	-
2036	17	-	0.3166	-
2037	18	-	0.2959	-
2038	19	-	0.2765	-
2039	20	-	0.2584	-
2040	21	-	0.2415	-
2041	22	-	0.2257	-
2042	23	-	0.2109	-
2043	24	-	0.1971	-
2044	25	-	0.1842	-
2045	26	19,284	0.1722	3,321
2046	27	9,642	0.1609	1,552
2047	28	9,642	0.1504	1,450
2048	29	-	0.1406	-
2049	30	-	0.1314	-
2050	31	-	0.1228	-
2051	32	-	0.1147	-
2052	33	-	0.1072	-
2053	34	-	0.1002	-
2054	35	-	0.0937	-
2055	36	-	0.0875	-
2056	37	-	0.0818	-
2057	38	-	0.0765	-
2058	39	-	0.0715	-
2059	40	-	0.0668	-
2060	41	15,807	0.0624	987
2061	42	7,904	0.0583	461
2062	43	7,904	0.0545	431
2063	44	-	0.0509	-
2064	45	-	0.0476	-
2065	46	-	0.0445	-
2066	47	-	0.0416	-
2067	48	-	0.0389	-
2068	49	-	0.0363	-
2069	50	-	0.0339	-
Total:		718,091		706,947

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual Construction Costs:		$ 51,225
Annual OMRR&R Costs:		3,959
Total Average Annual Costs:		$ 55,184

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 47
Average Annual Costs

Hurricane Protection Levee
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.3108	-
2016	-3	0	1.2250	-
2017	-2	0	1.1449	-
2018	-1	0	1.0700	-
2019	0	0	1.0000	-
2020	1	50	0.9346	47
2021	2	1558	0.8734	1,360
2022	3	1558	0.8163	1,271
2023	4	3377	0.7629	2,576
2024	5	1558	0.7130	1,111
2025	6	2737	0.6663	1,824
2026	7	3567	0.6227	2,221
2027	8	1890	0.5820	1,100
2028	9	1558	0.5439	847
2029	10	4377	0.5083	2,225
2030	11	4723	0.4751	2,244
2031	12	1964	0.4440	872
2032	13	3409	0.4150	1,415
2033	14	2474	0.3878	959
2034	15	1558	0.3624	565
2035	16	4857	0.3387	1,645
2036	17	1737	0.3166	550
2037	18	2474	0.2959	732
2038	19	3377	0.2765	934
2039	20	2037	0.2584	526
2040	21	5146	0.2415	1,243
2041	22	4389	0.2257	991
2042	23	1599	0.2109	337
2043	24	1858	0.1971	366
2044	25	3377	0.1842	622
2045	26	33213	0.1722	5,719
2046	27	1653	0.1609	266
2047	28	3719	0.1504	559
2048	29	1558	0.1406	219
2049	30	2474	0.1314	325
2050	31	36781	0.1228	4,516
2051	32	1954	0.1147	224
2052	33	1599	0.1072	171
2053	34	4293	0.1002	430
2054	35	1558	0.0937	146
2055	36	10038	0.0875	879
2056	37	12833	0.0818	1,050
2057	38	2389	0.0765	183
2058	39	1685	0.0715	120
2059	40	3843	0.0668	257
2060	41	5146	0.0624	321
2061	42	2457	0.0583	143
2062	43	3532	0.0545	193
2063	44	1858	0.0509	95
2064	45	1558	0.0476	74
2065	46	5345	0.0445	238
2066	47	1667	0.0416	69
2067	48	2043	0.0389	79
2068	49	3377	0.0363	123
2069	50	72782	0.0339	2,471
Total:		286,561		47,454

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual OMRR&R Costs:		$ 3,439

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 48
Average Annual Costs

Berm 1
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.3108	-
2016	-3		1.2250	-
2017	-2		1.1449	-
2018	-1		1.0700	-
2019	0		1.0000	-
2020	1	64	0.9346	60
2021	2	64	0.8734	56
2022	3	221	0.8163	180
2023	4	64	0.7629	49
2024	5	147	0.7130	105
2025	6	221	0.6663	147
2026	7	64	0.6227	40
2027	8	64	0.5820	37
2028	9	221	0.5439	120
2029	10	264	0.5083	134
2030	11	64	0.4751	30
2031	12	221	0.4440	98
2032	13	64	0.4150	27
2033	14	64	0.3878	25
2034	15	305	0.3624	111
2035	16	64	0.3387	22
2036	17	64	0.3166	20
2037	18	221	0.2959	65
2038	19	64	0.2765	18
2039	20	288	0.2584	74
2040	21	221	0.2415	53
2041	22	64	0.2257	14
2042	23	64	0.2109	14
2043	24	221	0.1971	44
2044	25	320	0.1842	59
2045	26	64	0.1722	11
2046	27	221	0.1609	36
2047	28	64	0.1504	10
2048	29	64	0.1406	9
2049	30	2579	0.1314	339
2050	31	64	0.1228	8
2051	32	64	0.1147	7
2052	33	221	0.1072	24
2053	34	64	0.1002	6
2054	35	1827	0.0937	171
2055	36	221	0.0875	19
2056	37	64	0.0818	5
2057	38	64	0.0765	5
2058	39	221	0.0715	16
2059	40	288	0.0668	19
2060	41	64	0.0624	4
2061	42	221	0.0583	13
2062	43	64	0.0545	3
2063	44	64	0.0509	3
2064	45	305	0.0476	15
2065	46	64	0.0445	3
2066	47	64	0.0416	3
2067	48	221	0.0389	9
2068	49	64	0.0363	2
2069	50	3567	0.0339	121
Total:		14,491		2,463

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual OMRR&R Costs:		$ 178

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 49
Average Annual Costs

Berm 2
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.3108	-
2016	-3		1.2250	-
2017	-2		1.1449	-
2018	-1		1.0700	-
2019	0		1.0000	-
2020	1	80	0.9346	75
2021	2	80	0.8734	70
2022	3	277	0.8163	226
2023	4	80	0.7629	61
2024	5	184	0.7130	131
2025	6	277	0.6663	185
2026	7	80	0.6227	50
2027	8	80	0.5820	47
2028	9	277	0.5439	151
2029	10	330	0.5083	168
2030	11	80	0.4751	38
2031	12	277	0.4440	123
2032	13	80	0.4150	33
2033	14	80	0.3878	31
2034	15	381	0.3624	138
2035	16	80	0.3387	27
2036	17	80	0.3166	25
2037	18	277	0.2959	82
2038	19	80	0.2765	22
2039	20	359	0.2584	93
2040	21	277	0.2415	67
2041	22	80	0.2257	18
2042	23	80	0.2109	17
2043	24	277	0.1971	55
2044	25	400	0.1842	74
2045	26	80	0.1722	14
2046	27	277	0.1609	45
2047	28	80	0.1504	12
2048	29	80	0.1406	11
2049	30	3224	0.1314	424
2050	31	80	0.1228	10
2051	32	80	0.1147	9
2052	33	277	0.1072	30
2053	34	80	0.1002	8
2054	35	2284	0.0937	214
2055	36	277	0.0875	24
2056	37	80	0.0818	7
2057	38	80	0.0765	6
2058	39	277	0.0715	20
2059	40	359	0.0668	24
2060	41	80	0.0624	5
2061	42	277	0.0583	16
2062	43	80	0.0545	4
2063	44	80	0.0509	4
2064	45	381	0.0476	18
2065	46	80	0.0445	4
2066	47	80	0.0416	3
2067	48	277	0.0389	11
2068	49	80	0.0363	3
2069	50	4459	0.0339	151
Total:		18,122		3,081

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual OMRR&R Costs:		$ 223

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 50
Average Annual Costs

Berm 3
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.3108	-
2016	-3		1.2250	-
2017	-2		1.1449	-
2018	-1		1.0700	-
2019	0		1.0000	-
2020	1	64	0.9346	60
2021	2	64	0.8734	56
2022	3	221	0.8163	180
2023	4	64	0.7629	49
2024	5	147	0.7130	105
2025	6	221	0.6663	147
2026	7	64	0.6227	40
2027	8	64	0.5820	37
2028	9	221	0.5439	120
2029	10	264	0.5083	134
2030	11	64	0.4751	30
2031	12	221	0.4440	98
2032	13	64	0.4150	27
2033	14	64	0.3878	25
2034	15	305	0.3624	111
2035	16	64	0.3387	22
2036	17	64	0.3166	20
2037	18	221	0.2959	65
2038	19	64	0.2765	18
2039	20	288	0.2584	74
2040	21	221	0.2415	53
2041	22	64	0.2257	14
2042	23	64	0.2109	14
2043	24	221	0.1971	44
2044	25	320	0.1842	59
2045	26	64	0.1722	11
2046	27	221	0.1609	36
2047	28	64	0.1504	10
2048	29	64	0.1406	9
2049	30	2,579	0.1314	339
2050	31	64	0.1228	8
2051	32	64	0.1147	7
2052	33	221	0.1072	24
2053	34	64	0.1002	6
2054	35	1,827	0.0937	171
2055	36	221	0.0875	19
2056	37	64	0.0818	5
2057	38	64	0.0765	5
2058	39	221	0.0715	16
2059	40	288	0.0668	19
2060	41	64	0.0624	4
2061	42	221	0.0583	13
2062	43	64	0.0545	3
2063	44	64	0.0509	3
2064	45	305	0.0476	15
2065	46	64	0.0445	3
2066	47	64	0.0416	3
2067	48	221	0.0389	9
2068	49	64	0.0363	2
2069	50	3,567	0.0339	121
Total:		14,491		2,463

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual OMRR&R Costs:		$ 178

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 51
Average Annual Costs

Installation of Flap Gates on Culverts
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.3108	-
2016	-3		1.2250	-
2017	-2		1.1449	-
2018	-1		1.0700	-
2019	0		1.0000	-
2020	1	58	0.9346	54
2021	2	58	0.8734	51
2022	3	203	0.8163	166
2023	4	58	0.7629	44
2024	5	135	0.7130	96
2025	6	203	0.6663	135
2026	7	58	0.6227	36
2027	8	58	0.5820	34
2028	9	203	0.5439	110
2029	10	242	0.5083	123
2030	11	58	0.4751	28
2031	12	203	0.4440	90
2032	13	58	0.4150	24
2033	14	58	0.3878	22
2034	15	280	0.3624	101
2035	16	58	0.3387	20
2036	17	58	0.3166	18
2037	18	203	0.2959	60
2038	19	58	0.2765	16
2039	20	264	0.2584	68
2040	21	203	0.2415	49
2041	22	58	0.2257	13
2042	23	58	0.2109	12
2043	24	203	0.1971	40
2044	25	293	0.1842	54
2045	26	58	0.1722	10
2046	27	203	0.1609	33
2047	28	58	0.1504	9
2048	29	58	0.1406	8
2049	30	2,364	0.1314	311
2050	31	58	0.1228	7
2051	32	58	0.1147	7
2052	33	203	0.1072	22
2053	34	58	0.1002	6
2054	35	1,675	0.0937	157
2055	36	203	0.0875	18
2056	37	58	0.0818	5
2057	38	58	0.0765	4
2058	39	203	0.0715	15
2059	40	264	0.0668	18
2060	41	58	0.0624	4
2061	42	203	0.0583	12
2062	43	58	0.0545	3
2063	44	58	0.0509	3
2064	45	280	0.0476	13
2065	46	58	0.0445	3
2066	47	58	0.0416	2
2067	48	203	0.0389	8
2068	49	58	0.0363	2
2069	50	3,270	0.0339	111
Total:		13,272		2,254

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual OMRR&R Costs:		$ 163

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 52
Average Annual Costs

Other Localized Storm Surge Risk Reduction Measures
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4		1.3108	-
2016	-3		1.2250	-
2017	-2		1.1449	-
2018	-1		1.0700	-
2019	0		1.0000	-
2020	1	-	0.9346	-
2021	2	-	0.8734	-
2022	3	-	0.8163	-
2023	4	-	0.7629	-
2024	5	-	0.7130	-
2025	6	-	0.6663	-
2026	7	-	0.6227	-
2027	8	-	0.5820	-
2028	9	-	0.5439	-
2029	10	-	0.5083	-
2030	11	-	0.4751	-
2031	12	-	0.4440	-
2032	13	-	0.4150	-
2033	14	-	0.3878	-
2034	15	-	0.3624	-
2035	16	-	0.3387	-
2036	17	-	0.3166	-
2037	18	-	0.2959	-
2038	19	-	0.2765	-
2039	20	-	0.2584	-
2040	21	-	0.2415	-
2041	22	-	0.2257	-
2042	23	-	0.2109	-
2043	24	-	0.1971	-
2044	25	-	0.1842	-
2045	26	-	0.1722	-
2046	27	-	0.1609	-
2047	28	-	0.1504	-
2048	29	-	0.1406	-
2049	30	-	0.1314	-
2050	31	-	0.1228	-
2051	32	-	0.1147	-
2052	33	-	0.1072	-
2053	34	-	0.1002	-
2054	35	-	0.0937	-
2055	36	-	0.0875	-
2056	37	-	0.0818	-
2057	38	-	0.0765	-
2058	39	-	0.0715	-
2059	40	-	0.0668	-
2060	41	-	0.0624	-
2061	42	-	0.0583	-
2062	43	-	0.0545	-
2063	44	-	0.0509	-
2064	45	-	0.0476	-
2065	46	-	0.0445	-
2066	47	-	0.0416	-
2067	48	-	0.0389	-
2068	49	-	0.0363	-
2069	50	-	0.0339	-
Total:		-		-

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual OMRR&R Costs:		$ -

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 53 A
Average Annual Costs
1% AEP (100-year) Levee Alignment Alternative C including all
Localized Storm Surge Risk Reduction Measures
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4	-	1.3108	-
2016	-3	-	1.2250	-
2017	-2	-	1.1449	-
2018	-1	-	1.0700	-
2019	0	-	1.0000	-
2020	1	316	0.9346	295
2021	2	1,824	0.8734	1,593
2022	3	2,480	0.8163	2,024
2023	4	3,643	0.7629	2,779
2024	5	2,171	0.7130	1,548
2025	6	3,659	0.6663	2,438
2026	7	3,833	0.6227	2,387
2027	8	2,156	0.5820	1,255
2028	9	2,480	0.5439	1,349
2029	10	5,477	0.5083	2,784
2030	11	4,989	0.4751	2,370
2031	12	2,886	0.4440	1,281
2032	13	3,675	0.4150	1,525
2033	14	2,740	0.3878	1,063
2034	15	2,829	0.3624	1,025
2035	16	5,123	0.3387	1,735
2036	17	2,003	0.3166	634
2037	18	3,396	0.2959	1,005
2038	19	3,643	0.2765	1,007
2039	20	3,236	0.2584	836
2040	21	6,068	0.2415	1,466
2041	22	4,655	0.2257	1,051
2042	23	1,865	0.2109	393
2043	24	2,780	0.1971	548
2044	25	4,710	0.1842	868
2045	26	33,479	0.1722	5,765
2046	27	2,575	0.1609	414
2047	28	3,985	0.1504	599
2048	29	1,824	0.1406	256
2049	30	13,220	0.1314	1,737
2050	31	37,047	0.1228	4,548
2051	32	2,220	0.1147	255
2052	33	2,521	0.1072	270
2053	34	4,559	0.1002	457
2054	35	9,171	0.0937	859
2055	36	10,960	0.0875	959
2056	37	13,099	0.0818	1,072
2057	38	2,655	0.0765	203
2058	39	2,607	0.0715	186
2059	40	5,042	0.0668	337
2060	41	5,412	0.0624	338
2061	42	3,379	0.0583	197
2062	43	3,798	0.0545	207
2063	44	2,124	0.0509	108
2064	45	2,829	0.0476	135
2065	46	5,611	0.0445	250
2066	47	1,933	0.0416	80
2067	48	2,965	0.0389	115
2068	49	3,643	0.0363	132
2069	50	87,645	0.0339	2,975
Total:		346,937		57,716

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual OMRR&R Costs:		$ 4,182

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 53 B
Average Annual Costs
1% AEP (100-year) Levee Alignment Alternative C including all
Localized Storm Surge Risk Reduction Measures Except Berm 2
West Shore Lake Pontchartrain, La. Feasibility Study

Year	Analysis Year	OMRR&R Costs ($1000's)	Present Value Factor	Present Value of Costs ($1000's)
2015	-4	-	1.3108	-
2016	-3	-	1.2250	-
2017	-2	-	1.1449	-
2018	-1	-	1.0700	-
2019	0	-	1.0000	-
2020	1	236	0.9346	221
2021	2	1,744	0.8734	1,523
2022	3	2,203	0.8163	1,798
2023	4	3,563	0.7629	2,718
2024	5	1,987	0.7130	1,416
2025	6	3,382	0.6663	2,253
2026	7	3,753	0.6227	2,337
2027	8	2,076	0.5820	1,208
2028	9	2,203	0.5439	1,198
2029	10	5,147	0.5083	2,617
2030	11	4,909	0.4751	2,332
2031	12	2,609	0.4440	1,158
2032	13	3,595	0.4150	1,492
2033	14	2,660	0.3878	1,032
2034	15	2,448	0.3624	887
2035	16	5,043	0.3387	1,708
2036	17	1,923	0.3166	609
2037	18	3,119	0.2959	923
2038	19	3,563	0.2765	985
2039	20	2,877	0.2584	744
2040	21	5,791	0.2415	1,399
2041	22	4,575	0.2257	1,033
2042	23	1,785	0.2109	377
2043	24	2,503	0.1971	494
2044	25	4,310	0.1842	794
2045	26	33,399	0.1722	5,751
2046	27	2,298	0.1609	370
2047	28	3,905	0.1504	587
2048	29	1,744	0.1406	245
2049	30	9,996	0.1314	1,313
2050	31	36,967	0.1228	4,539
2051	32	2,140	0.1147	246
2052	33	2,244	0.1072	241
2053	34	4,479	0.1002	449
2054	35	6,887	0.0937	645
2055	36	10,683	0.0875	935
2056	37	13,019	0.0818	1,065
2057	38	2,575	0.0765	197
2058	39	2,330	0.0715	166
2059	40	4,683	0.0668	313
2060	41	5,332	0.0624	333
2061	42	3,102	0.0583	181
2062	43	3,718	0.0545	203
2063	44	2,044	0.0509	104
2064	45	2,448	0.0476	117
2065	46	5,531	0.0445	246
2066	47	1,853	0.0416	77
2067	48	2,688	0.0389	104
2068	49	3,563	0.0363	129
2069	50	83,186	0.0339	2,824
Total:		328,815		54,634

OMB Discount Rate:	7.00%	
Amortization Factor:	0.07246	
Average Annual OMRR&R Costs:		$ 3,959

Note: Costs are in October 2014 Price Levels (Fiscal Year 2015)

Table 54
1% AEP (100-year) Levee Alignment Alternative C
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages 2012 Prices (2020-2070)	Equiv Annual With-Project Damages 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 161,666	$ 91,108	$ 70,558	$ 72,675
First Costs				$ 676,598
Interest During Construction				$ 73,101
Annual Operation & Maintenance Costs				$ 178
Total Annual Costs			$ 46,860	$ 48,310
B/C Ratio			1.51	1.50
Equivalent Annual Net Benefits - 2020 Base Year			$ 23,697	$ 24,365

Table 55
Berm 1
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 1,704	$ 861	$ 843	$ 869
First Costs				$ 14,280
Interest During Construction				$ 500
Annual Operation & Maintenance Costs				$ 178
Total Annual Costs			$ 1,197	$ 1,234
B/C Ratio			0.70	0.70
Equivalent Annual Net Benefits - 2020 Base Year			$ (354)	$ (366)

Table 56
Berm 2
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 725	$ 546	$ 179	$ 184
First Costs				$ 17,943
Interest During Construction				$ 628
Annual Operation & Maintenance Costs				$ 223
Total Annual Costs			$ 1,522	$ 1,569
B/C Ratio			0.12	0.12
Equivalent Annual Net Benefits - 2020 Base Year			$ (1,343)	$ (1,385)

Table 57
Berm 3
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 1,172	$ 400	$ 772	$ 795
First Costs				$ 14,218
Interest During Construction				$ 498
Annual Operation & Maintenance Costs				$ 178
Total Annual Costs			$ 1,207	$ 1,245
B/C Ratio			0.64	0.64
Equivalent Annual Net Benefits - 2020 Base Year			$ (436)	$ (450)

Table 58
Installation of Flap Gates on Culverts
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 2,841	$ 1,952	$ 889	$ 915
First Costs				$ 5,990
Interest During Construction				$ 210
Annual Operation & Maintenance Costs				$ 163
Total Annual Costs			$ 594	$ 613
B/C Ratio			1.50	1.49
Equivalent Annual Net Benefits - 2020 Base Year			$ 295	$ 303

Table 59
Structure Raising Outside of Berms and Levee
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 1,948	$ 145	$ 1,803	$ 1,857
First Costs				$ 7,005
Interest During Construction				$ -
Annual Operation & Maintenance Costs				$ -
Total Annual Costs			$ 492	$ 508
B/C Ratio			3.66	3.66
Equivalent Annual Net Benefits - 2020 Base Year			$ 1,311	$ 1,350

Table 60 A
All of the Localized Flood Risk Reduction Measures Outside of Levee Alignment
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 8,390	$ 3,904	$ 4,486	$ 4,620
First Costs				$ 59,436
Interest During Construction				$ 1,835
Annual Operation & Maintenance Costs				$ 728
Total Annual Costs			$ 5,013	$ 5,168
B/C Ratio			0.89	0.89
Equivalent Annual Net Benefits - 2020 Base Year			$ (527)	$ (548)

Note: Localized Flood Risk Reduction Measures outside of the levee alignment include the earthen berms, installation of flap gates on culverts and other localized flood risk reduction measures including structure raising and flood proofing.

Table 60 B
All of the Localized Flood Risk Reduction Measures Outside of Levee Alignment Excluding Berm 2
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 7,665	$ 3,358	$ 4,307	$ 4,436
First Costs				$ 41,493
Interest During Construction				$ 1,207
Annual Operation & Maintenance Costs				$ 505
Total Annual Costs			$ 3,491	$ 3,599
B/C Ratio			1.23	1.23
Equivalent Annual Net Benefits - 2020 Base Year			$ 816	$ 837

Note: Localized Flood Risk Reduction Measures outside of the levee alignment include the earthen berms, installation of flap gates on culverts and other localized flood risk reduction measures including structure raising and flood proofing.

Table 61 A
1% AEP (100-year) Levee Alignment Alternative C Including All Localized Storm Surge Risk Reduction Measures
Summation of Separate HEC-FDA Model Executions
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 170,056	$ 95,012	$ 75,044	$ 77,295
First Costs				$ 736,034
Interest During Construction				$ 74,936
Annual Operation & Maintenance Costs				$ 4,182
Total Annual Costs			$ 55,050	$ 56,753
B/C Ratio			1.36	1.36
Equivalent Annual Net Benefits - 2020 Base Year			$ 19,993	$ 20,542

Note: Future Development is not included in St. James Parish

Table 61 B
Recommended Plan
1% AEP (100-year) Levee Alignment Alternative C Including All Localized Flood Risk Reduction Measures Excluding Berm 2
Summation of Separate HEC-FDA Model Executions
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 169,331	$ 94,466	$ 74,865	$ 77,111
First Costs				$ 718,091
Interest During Construction				$ 74,308
Annual Operation & Maintenance Costs				$ 3,959
Total Annual Costs			$ 53,529	$ 55,184
B/C Ratio			1.40	1.40
Equivalent Annual Net Benefits - 2020 Base Year			$ 21,336	$ 21,927

Note: Future Development is not included in St. James Parish

Table 61 C
Recommended Plan
1% AEP (100-year) Levee Alignment Alternative C Including All Localized Flood Risk Reduction Measures Excluding Berm 2
HEC-FDA Model Results for Combined Flood Risk Management System Components
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 173,332	$ 93,385	$ 79,947	$ 82,346
First Costs				$ 718,091
Interest During Construction				$ 74,308
Annual Operation & Maintenance Costs				$ 3,959
Total Annual Costs			$ 53,529	$ 55,184
B/C Ratio			1.49	1.49
Equivalent Annual Net Benefits - 2020 Base Year			$ 26,419	$ 27,161

Note: Future Development is not included in St. James Parish

Table 62
Westshore Lake Pontchartrain, LA Feasibility Study
Regional Economic Development Analysis (RED)
Impact Region Profile and Summary of Impacts

County	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Ascension	303	104,702	37,280	$3,916
Assumption	365	23,632	8,552	$799
East Baton Rouge	469	429,211	166,068	$18,149
East Feliciana	456	21,057	6,827	$695
Iberville	653	32,987	10,770	$1,035
Jefferson	496	439,261	169,681	$19,446
Lafourche	1,177	93,768	33,790	$3,954
Livingston	703	122,404	43,929	$3,848
Orleans	349	326,968	124,294	$15,261
Plaquemines	1,041	27,039	9,364	$895
Pointe Coupee	591	23,137	8,750	$784
St Bernard	488	29,365	11,218	$1,224
St Charles	410	53,810	18,475	$1,969
St Helena	410	10,582	4,004	$336
St James	258	22,227	7,460	$689
St John The Baptist	348	48,996	16,546	$1,618
St Tammany	1,110	240,775	87,796	$10,406
Terrebonne	1,480	111,202	38,980	$4,268
West Baton Rouge	205	23,108	8,375	$805
West Feliciana	426	15,503	3,846	$421
Total	**11,737**	**2,199,734**	**816,005**	**$90,517**

Table 62
(Continued)
Westshore Lake Pontchartrain, LA Feasibility Study
Regional Economic Development Analysis (RED)
Impact Region Profile and Summary of Impacts

Impact	Regional	State	National
		Direct Impact	
Output ($000)	962,423	1,004,928	1,063,136
Labor Years (Jobs)	9,741	10,107	10,846
Income ($000)	571,651	610,273	639,606
GRP ($000)	657,907	700,201	732,939
		Secondary Impact	
Output ($000)	781,556	832,937	1,824,677
Labor Years (Jobs)	6,032	6,516	11,434
Income ($000)	281,832	296,964	602,444
GRP ($000)	472,137	498,267	1,039,021
		Total Impact	
Output ($000)	1,743,979	1,837,865	2,887,813
Labor Years (Jobs)	15,773	16,623	22,280
Income ($000)	853,483	907,237	1,242,049
GRP ($000)	1,130,044	1,198,467	1,771,959

Table 63
2% AEP (50-year) Levee Alignment Alternative C
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages 2012 Prices (2020-2070)	Equiv Annual With-Project Damages 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	190,330.0	122,646.0	67,684.0	$ 69,715
First Costs				$ 542,522
Interest During Construction				$ 28,584
Annual Operation & Maintenance Costs				$ 2,067
Total Annual Costs			$ 21,830	$ 22,505
B/C Ratio			3.10	3.10
Equivalent Annual Net Benefits - 2020 Base Year			$ 45,854	$ 47,210

Note: Calculations based on preliminary cost estimates prepared prior to MII Cost and Risk Analysis.

Table 64
1% AEP (100-year) Levee Alignment Alternative C
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	190,330.0	98,839.0	91,491.0	$ 94,236
First Costs				$ 556,971
Interest During Construction				$ 27,066
Annual Operation & Maintenance Costs				$ 2,067
Total Annual Costs			$ 22,488	$ 23,184
B/C Ratio			4.07	4.06
Equivalent Annual Net Benefits - 2020 Base Year			$ 69,003	$ 71,052

Note: Calculations based on preliminary cost estimates prepared prior to MII Cost and Risk Analysis.

Table 65
0.5% AEP (200-year) Levee Alignment Alternative C
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	190,330.0	82,485.0	107,845.0	$ 111,080
First Costs				$ 1,036,405
Interest During Construction				$ 54,347
Annual Operation & Maintenance Costs				$ 2,067
Total Annual Costs			$ 43,380	$ 44,722
B/C Ratio			2.49	2.48
Equivalent Annual Net Benefits - 2020 Base Year			$ 64,465	$ 66,358

Note: Calculations based on preliminary cost estimates prepared prior to MII Cost and Risk Analysis.

Table 66
1% AEP (100-year) Levee Alignment Alternative C Without Future Development
Sensitivity Analysis
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages 2012 Prices (2020-2070)	Equiv Annual With-Project Damages 2012 Prices (2020-2070)	Equiv Annual Benefits 2012 Prices (2020-2070)	Equiv Annual Benefits 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 94,317	$ 24,805	$ 69,511	$ 72,124
First Costs				$ 676,598
Interest During Construction				$ 35,461
Annual Operation & Maintenance Costs				$ 4,374
Total Annual Costs			$ 31,160	$ 32,124
B/C Ratio			2.23	2.25
Equivalent Annual Net Benefits - 2020 Base Year			$ 38,351	$ 40,000

Note: Inducements of $215,110 attributed to the 0.01 AEP Level of Risk Reduction Structural System are included in the analysis.

Table 67
1% AEP (100-year) Levee Alignment Alternative C including all Localized Storm Surge Risk Reduction Measures without Future Development
Summation of Separate HEC-FDA Model Executions
Sensitivity Analysis
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits 2012 Prices (2020-2070)	Equiv Annual Benefits 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 104,838	$ 29,825	$ 75,013	$ 77,832
First Costs				$ 736,034
Interest During Construction				$ 36,379
Annual Operation & Maintenance Costs				$ 5,302
Total Annual Costs			$ 34,556	$ 35,625
B/C Ratio			2.17	2.18
Equivalent Annual Net Benefits - 2020 Base Year			$ 40,457	$ 42,207

Table 68
1% AEP (100-year) Levee Alignment Alternative C Without Future Development
Summation of Separate HEC-FDA Model Executions
Sensitivity Analysis
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages 2012 Prices (2020-2070)	Equiv Annual With-Project Damages 2012 Prices (2020-2070)	Equiv Annual Benefits 2012 Prices (2020-2070)	Equiv Annual Benefits 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 83,919	$ 25,202	$ 58,717	$ 60,924
First Costs				$ 676,598
Interest During Construction				$ 73,101
Annual Operation & Maintenance Costs				$ 178
Total Annual Costs			$ 46,860	$ 48,310
B/C Ratio			1.25	1.26
Equivalent Annual Net Benefits - 2020 Base Year			$ 11,857	$ 12,614

Table 69 A
1% AEP (100-year) Levee Alignment Alternative C including all Localized Storm Surge Risk Reduction Measures without Future Development
Summation of Separate HEC-FDA Model Executions
Sensitivity Analysis
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits 2012 Prices (2020-2070)	Equiv Annual Benefits 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 92,309	$ 29,106	$ 63,203	$ 65,578
First Costs				$ 736,034
Interest During Construction				$ 74,936
Annual Operation & Maintenance Costs				$ 4,182
Total Annual Costs			$ 55,050	$ 56,753
B/C Ratio			1.15	1.16
Equivalent Annual Net Benefits - 2020 Base Year			$ 8,153	$ 8,825

Table 69 B
Recommended Plan Without Future Development
Summation of Separate HEC-FDA Model Executions
Sensitivity Analysis
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study

$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits 2012 Prices (2020-2070)	Equiv Annual Benefits 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 103,933	$ 29,143	$ 74,790	$ 77,601
First Costs				$ 718,091
Interest During Construction				$ 36,065
Annual Operation & Maintenance Costs				$ 5,023
Total Annual Costs			$ 33,531	$ 34,568
B/C Ratio			2.23	2.24
Equivalent Annual Net Benefits - 2020 Base Year			$ 41,260	$ 43,033

Note: Includes structural alignment and localized Storm Surge Risk Reduction measures excluding Berm 2.

Table 69 C
Recommended Plan Without Future Development
Summation of Separate HEC-FDA Model Executions
Sensitivity Analysis
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study

$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits 2012 Prices (2020-2070)	Equiv Annual Benefits 2014 Prices (2020-2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 91,584	$ 28,560	$ 63,024	$ 65,393
First Costs				$ 718,091
Interest During Construction				$ 74,308
Annual Operation & Maintenance Costs				$ 3,959
Total Annual Costs			$ 53,529	$ 55,184
B/C Ratio			1.18	1.18
Equivalent Annual Net Benefits - 2020 Base Year			$ 9,496	$ 10,208

Note: Includes structural alignment and localized Storm Surge Risk Reduction measures excluding Berm 2.

Table 69 D
Recommended Plan
1% AEP (100-year) Levee Alignment Alternative C Including All Localized Storm Surge Risk Reduction Measures Excluding Berm 2
HEC-FDA Model Results for Combined Flood Risk Management System Components
Sensitivity Analysis
(2012 and 2014 Price Levels; 3.5% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020 2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 112,169	$ 30,584	$ 81,584	$ 84,032
First Costs				$ 718,091
Interest During Construction				$ 36,065
Annual Operation & Maintenance Costs				$ 5,023
Total Annual Costs			$ 33,531	$ 34,568
B/C Ratio			2.43	2.43
Equivalent Annual Net Benefits - 2020 Base Year			$ 48,053	$ 49,464

Table 69 E
Recommended Plan
1% AEP (100-year) Levee Alignment Alternative C Including All Localized Storm Surge Risk Reduction Measures Excluding Berm 2
HEC-FDA Model Results for Combined Flood Risk Management System Components
Sensitivity Analysis
(2012 and 2014 Price Levels; 7% Discount Rate)
Total Equivalent Annual Net Benefits
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

Item	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits and Costs 2012 Prices (2020-2070)	Equiv Annual Benefits and Costs 2014 Prices (2020 2070)
Damage Category				
Residential & Commercial - Structure/Content/Vehicles	$ 99,793	$ 29,517	$ 70,276	$ 72,385
First Costs				$ 718,091
Interest During Construction				$ 74,308
Annual Operation & Maintenance Costs				$ 3,959
Total Annual Costs			$ 53,529	$ 55,184
B/C Ratio			1.31	1.31
Equivalent Annual Net Benefits - 2020 Base Year			$ 16,748	$ 17,201

West Shore Lake Pontchartrain
Sea Level Rise Sensitivity Analysis
Table 70
Alternative C - Levee Alignment

	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits 2012 Prices (2020-2070)	Equiv Annual Benefits 2014 Prices (2020-2070)	Annual Costs	B/C Ratio	Net Benefits
Calculations based on with and without intermediate sea level rise including future development as of 2014.	$ 190,330	$ 105,399	$ 84,931	$ 87,479	$ 23,184	3.77	$ 64,295
Estimate of low sea level rise benefits based on percent change from draft report. Preliminary costs are based on providing a 50 year level or risk reduction.	$ 151,057	$ 83,651	$ 67,406	$ 69,428	$ 22,505	3.09	$ 46,923
Estimate of high sea level rise benefits based on percent change from previous analysis . Preliminary costs are based on providing a 200 year level or risk reduction.	$ 348,448	$ 192,961	$ 155,487	$ 160,152	$ 44,722	3.58	$ 115,430

Note: Calculations based on preliminary cost estimates prepared prior to MII Cost and Risk Analysis.

West Shore Lake Pontchartrain
Sea Level Rise Sensitivity Analysis
Table 71
Alternative C - Levee Alignment - Without Future Development

	Equiv Annual W/O Project Damages (2020-2070)	Equiv Annual With-Project Damages (2020-2070)	Equiv Annual Benefits 2012 Prices (2020-2070)	Equiv Annual Benefits 2014 Prices (2020-2070)	Annual Costs	B/C Ratio	Net Benefits
Calculations based with and without intermediate sea level rise without future development as of 2014.	$ 104,663	$ 35,437	$ 69,226	$ 71,303	$ 23,184	3.08	$ 48,119
Estimate of low sea level rise benefits based on percent change from draft report. Preliminary costs are based on providing a 50 year level or risk reduction.	$ 83,067	$ 28,125	$ 54,942	$ 56,590	$ 22,505	2.51	$ 34,085
Estimate of high sea level rise benefits based on percent change from previous analysis . Preliminary costs are based on providing a 200 year level or risk reduction.	$ 191,612	$ 64,877	$ 126,736	$ 130,538	$ 44,722	2.92	$ 85,816

Note: Calculations based on preliminary cost estimates prepared prior to MII Cost and Risk Analysis.

Table 72
Risk Analysis
Probability that Equivalent Annual Benefits Exceed Annual Costs
(2014 Price Level; 3.5% Discount Rate)
West Shore Lake Pontchartrain, LA Feasibility Study
$1000s

		Probabilty Damage Reduced Exceeds Indicated Values (2014 price levels)				
Component	Equivalent Annual Damages Reduced (2014 prices)	0.75	0.50	0.25	Annual Costs (2014 price levels)	Probabilty Benefits Exceed Costs
0.01 AEP (100-year) Level of Risk Reduction						
Structural System	87,922	61,436	84,331	110,252	32,124	Greater than 75 percent
Berm 1	1,073	524	981	1,567	842	Between 50 and 75 percent
Berm 2	229	108	209	348	1,057	Less than a 75 percent
Berm 3	956	267	762	1,477	839	Between 25 and 50 percent
Installation of Flapgates on Culverts	1,119	834	1,107	1,437	464	Greater than 75 percent
Structure Raising outside of Berms and Levee	2,290	1,017	2,028	3,290	299	Greater than 75 percent
Reduction Measures	93,588	69,516	93,923	121,604	35,625	Greater than 75 percent
Recommended Plan which excluding Berm 2	93,359	69,409	93,714	121,257	34,568	Greater than 75 percent

Table 73
Project Performance by Study Area Reach
Levee Alignment C
Without Project
2020
West Shore Lake Pontchartrain

Study Area Reach	Target Stage	Geo Tech	Target Stage Annual Exceedance		Long-Term Risk (years)			Conditional Non-Exceedance Probability by Events					
			Median	Expected	10	30	50	0.10	0.04	0.02	0.01	0.004	0.002
SA 1	5.480		0.8361	0.8345	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 10	4.710		0.0265	0.0262	0.2336	0.5498	0.7355	1.0000	0.9998	0.0450	0.0000	0.0000	0.0000
SA 11	7.600		0.0403	0.0416	0.3459	0.7202	0.8803	0.9977	0.4962	0.1892	0.0969	0.0453	0.0277
SA 12	6.510		0.6184	0.6188	0.9999	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 13	5.740		0.0677	0.0693	0.5122	0.8839	0.9724	0.8057	0.2140	0.1222	0.0000	0.0000	0.0000
SA 14	8.100		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 15	9.370		0.8525	0.8505	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 16	5.340		0.9224	0.9159	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 17	3.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 18	3.550		0.0584	0.0625	0.4758	0.8560	0.9604	0.8687	0.2963	0.0507	0.0136	0.0042	0.0026
SA 19	4.950		0.0219	0.0224	0.2028	0.4933	0.6779	0.9997	0.9455	0.4370	0.1521	0.0505	0.0275
SA 2	5.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 20	3.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 21	4.010		0.1733	0.1684	0.8418	0.9960	0.9999	0.1037	0.0065	0.0000	0.0000	0.0000	0.0000
SA 22	5.130		0.9822	0.9787	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 23	6.400		0.7995	0.7990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 24	6.510		0.0583	0.0650	0.4892	0.8667	0.9652	0.8467	0.3026	0.0124	0.0000	0.0000	0.0000
SA 25	4.080		0.4754	0.4722	0.9983	1.0000	1.0000	0.0103	0.0014	0.0000	0.0000	0.0000	0.0000
SA 26	4.220		0.0397	0.0518	0.4124	0.7971	0.9299	0.9135	0.5085	0.0372	0.0086	0.0025	0.0015
SA 27	3.060		0.1334	0.1303	0.7524	0.9848	0.9991	0.1973	0.0142	0.0000	0.0000	0.0000	0.0000
SA 28X	4.040		0.0655	0.0719	0.5258	0.8933	0.9760	0.7460	0.2444	0.0192	0.0038	0.0000	0.0000
SA 28Y	3.640		0.0969	0.0948	0.6305	0.9495	0.9931	0.5204	0.0966	0.0085	0.0021	0.0000	0.0000
SA 29	5.170		0.0316	0.0348	0.2983	0.6545	0.8299	0.9889	0.7741	0.1641	0.0388	0.0125	0.0063
SA 29C	3.500		0.8642	0.8616	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 3	13.600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 30	4.170		0.0750	0.0799	0.5652	0.9178	0.9845	0.6490	0.1897	0.0100	0.0000	0.0000	0.0000
SA 30C	4.290		0.0686	0.0747	0.5399	0.9026	0.9794	0.7086	0.2222	0.0195	0.0033	0.0000	0.0000
SA 31	5.960		0.0293	0.0293	0.2570	0.5898	0.7736	0.9990	0.9527	0.1364	0.0363	0.0131	0.0067
SA 31C	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 32	4.780		0.0488	0.0574	0.4461	0.8301	0.9479	0.8976	0.3946	0.0313	0.0104	0.0042	0.0027
SA 33	5.460		0.0359	0.0394	0.3308	0.7004	0.8658	0.9986	0.6998	0.0880	0.0343	0.0182	0.0131
SA 34	4.770		0.0566	0.0602	0.4623	0.8445	0.9551	0.9233	0.3166	0.0421	0.0182	0.0105	0.0074
SA 35	4.880		0.0536	0.0582	0.4511	0.8346	0.9502	0.9205	0.3433	0.0494	0.0217	0.0126	0.0093
SA 36	5.510		0.0378	0.0446	0.3664	0.7456	0.8979	0.9718	0.5785	0.0772	0.0237	0.0100	0.0057
SA 37	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 38	5.320		0.0425	0.0507	0.4054	0.7898	0.9257	0.9526	0.4680	0.0605	0.0234	0.0121	0.0084
SA 39	6.560		0.0296	0.0303	0.2647	0.6025	0.7851	0.9993	0.8637	0.1933	0.0711	0.0305	0.0193
SA 39C	8.220		0.0182	0.0175	0.1620	0.4115	0.5868	0.9997	0.9966	0.5514	0.2519	0.1178	0.0747
SA 4	11.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 40P	3.560		0.0935	0.0923	0.6204	0.9453	0.9921	0.5374	0.1095	0.0052	0.0016	0.0000	0.0000
SA 41	4.560		0.0663	0.0709	0.5205	0.8898	0.9747	0.7887	0.2361	0.0216	0.0083	0.0040	0.0029
SA 41P	5.030		0.0335	0.0382	0.3224	0.6888	0.8571	0.9731	0.7353	0.1123	0.0229	0.0056	0.0028
SA 42P	6.140		0.0304	0.0310	0.2702	0.6113	0.7930	0.9970	0.9123	0.1226	0.0323	0.0116	0.0062
SA 43P	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 44C	1.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 5	11.720		0.7618	0.7608	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 6	12.100		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 7	5.920		0.1957	0.2032	0.8968	0.9989	1.0000	0.0723	0.0082	0.0000	0.0000	0.0000	0.0000
SA 8	8.020		0.0265	0.0381	0.3220	0.6884	0.8568	0.9405	0.6974	0.3814	0.0000	0.0000	0.0000
SA 9	4.200		0.2054	0.2132	0.9090	0.9992	1.0000	0.0234	0.0000	0.0000	0.0000	0.0000	0.0000

Table 73 cont.
Levee Alignment C
With Project
2020

Study Area	Target		Target Stage Annual Exceedance		Long-Term Risk (years)			Conditional Non-Exceedance Probability by Events					
Reach	Stage	Geo Tech	Median	Expected	10	30	50	0.10	0.04	0.02	0.01	0.004	0.002
SA 1	5.480		0.8360	0.8345	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 10	4.710		0.0078	0.0080	0.0767	0.2129	0.3290	0.9996	0.9996	0.9996	0.6860	0.1637	0.0496
SA 11	7.600		0.0403	0.0416	0.3461	0.7204	0.8804	0.9977	0.4958	0.1890	0.0968	0.0452	0.0277
SA 12	6.510		0.6189	0.6192	0.9999	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 13	5.740		0.0678	0.0687	0.5094	0.8819	0.9716	0.7980	0.2121	0.1191	0.0654	0.0109	0.0024
SA 14	8.100		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 15	9.370		0.8521	0.8502	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 16	5.340		0.9221	0.9147	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 17	3.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 18	3.550		0.0082	0.0080	0.0769	0.2134	0.3297	0.9997	0.9997	0.9997	0.7405	0.0776	0.0153
SA 19	4.950		0.0001	0.0001	0.0010	0.0031	0.0052	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
SA 2	5.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 20	3.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 21	4.010		0.1733	0.1718	0.8482	0.9965	0.9999	0.0597	0.0041	0.0000	0.0000	0.0000	0.0000
SA 22	5.130		0.9821	0.9771	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 23	6.400		0.7989	0.7982	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 24	6.510		0.0583	0.0606	0.4646	0.8466	0.9560	0.8991	0.2452	0.0992	0.0195	0.0035	0.0000
SA 25	4.080		0.4751	0.4716	0.9983	1.0000	1.0000	0.0059	0.0000	0.0000	0.0000	0.0000	0.0000
SA 26	4.220		0.0004	0.0011	0.0105	0.0312	0.0514	0.9998	0.9998	0.9998	0.9980	0.9466	0.8295
SA 27	3.060		0.0070	0.0107	0.1024	0.2768	0.4173	0.9997	0.9788	0.8094	0.6296	0.3306	0.2015
SA 28X	4.040		0.0007	0.0015	0.0148	0.0438	0.0720	0.9998	0.9998	0.9995	0.9935	0.9017	0.7495
SA 28Y	3.640		0.0018	0.0032	0.0314	0.0912	0.1473	0.9998	0.9998	0.9898	0.9457	0.7227	0.5232
SA 29	5.170		0.0001	0.0005	0.0054	0.0160	0.0266	0.9997	0.9997	0.9997	0.9997	0.9994	0.9921
SA 29C	3.500		0.8639	0.8603	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 3	13.600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 30	4.170		0.0005	0.0012	0.0118	0.0351	0.0578	0.9998	0.9998	0.9998	0.9964	0.9345	0.8082
SA 30C	4.290		0.0003	0.0009	0.0093	0.0275	0.0455	0.9998	0.9998	0.9998	0.9988	0.9590	0.8559
SA 31	5.960		0.0001	0.0002	0.0024	0.0073	0.0121	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
SA 31C	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 32	4.780		0.0003	0.0006	0.0064	0.0191	0.0316	0.9996	0.9996	0.9996	0.9996	0.9892	0.9330
SA 33	5.460		0.0001	0.0001	0.0010	0.0030	0.0050	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
SA 34	4.770		0.0010	0.0031	0.0304	0.0885	0.1431	0.9998	0.9954	0.9799	0.9273	0.7760	0.6418
SA 35	4.880		0.0001	0.0004	0.0039	0.0116	0.0192	0.9997	0.9997	0.9997	0.9997	0.9997	0.9987
SA 36	5.510		0.0001	0.0002	0.0017	0.0052	0.0086	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
SA 37	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 38	5.320		0.0003	0.0004	0.0036	0.0109	0.0181	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
SA 39	6.560		0.0001	0.0002	0.0022	0.0066	0.0109	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
SA 39C	8.220		0.0001	0.0002	0.0020	0.0061	0.0102	0.9995	0.9995	0.9995	0.9995	0.9995	0.9995
SA 4	11.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 40P	3.560		0.0022	0.0037	0.0364	0.1051	0.1690	0.9997	0.9997	0.9836	0.9256	0.6769	0.4781
SA 41	4.560		0.0001	0.0005	0.0051	0.0152	0.0252	0.9998	0.9998	0.9998	0.9998	0.9965	0.9787
SA 41P	5.030		0.0001	0.0005	0.0050	0.0149	0.0247	0.9998	0.9998	0.9998	0.9998	0.9987	0.9859
SA 42P	6.140		0.0001	0.0004	0.0043	0.0128	0.0213	0.9998	0.9997	0.9997	0.9997	0.9997	0.9997
SA 43P	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 44C	1.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 5	11.720		0.7625	0.7615	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 6	12.100		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 7	5.920		0.1958	0.2049	0.8991	0.9990	1.0000	0.0522	0.0035	0.0000	0.0000	0.0000	0.0000
SA 8	8.020		0.0265	0.0352	0.3014	0.6590	0.8336	0.9458	0.7108	0.3656	0.1323	0.0207	0.0036
SA 9	4.200		0.2056	0.2130	0.9089	0.9992	1.0000	0.0253	0.0000	0.0000	0.0000	0.0000	0.0000

Table 73 cont.
Localized Storm Surge Risk Reduction Measures
Without Project
2020

Study Area Reach	Target Stage	Geo Tech	Target Stage Annual Exceedance		Long-Term Risk (years)			Conditional Non-Exceedance Probability by Events					
			Median	Expected	10	30	50	0.10	0.04	0.02	0.01	0.004	0.002
1	2.980		0.1022	0.1007	0.6540	0.9586	0.9950	0.4764	0.0832	0.0093	0.0033	0.0018	0.0000
10	0.000	L	0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	4.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	4.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	4.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	4.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	3.200		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	4.600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	3.200		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	3.360		0.0709	0.0728	0.5302	0.8963	0.9771	0.7668	0.2079	0.0617	0.0182	0.0064	0.0039
20	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
22	4.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	4.200		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24	3.070		0.0938	0.0962	0.6362	0.9519	0.9936	0.5637	0.0836	0.0273	0.0082	0.0028	0.0019
25	4.600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
26	4.600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
27	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
29	3.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	3.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30	3.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
31	6.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
32	4.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
33	3.710		0.0523	0.0507	0.4054	0.7898	0.9257	0.9968	0.3390	0.1512	0.0422	0.0141	0.0087
34	2.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35	2.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
36	3.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
37	3.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
38	4.200		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
39	3.200		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	4.600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40	3.200		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
41	2.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	4.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
43	4.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
44	2.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
46	4.120		0.0334	0.0353	0.3022	0.6603	0.8346	0.9998	0.6608	0.2210	0.0753	0.0324	0.0219
47	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	4.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49	4.600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	4.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50	3.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51	3.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
52	4.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
53	3.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54	3.520		0.0677	0.0667	0.4987	0.8740	0.9683	0.9012	0.2173	0.0682	0.0241	0.0123	0.0090
55	4.220		0.0278	0.0313	0.2727	0.6153	0.7965	0.9990	0.6985	0.3490	0.1111	0.0301	0.0154
56	4.610		0.0199	0.0233	0.2096	0.5062	0.6915	0.9997	0.8711	0.5021	0.1663	0.0503	0.0252
57	3.630		0.0539	0.0608	0.4658	0.8476	0.9565	0.7603	0.4026	0.2092	0.0967	0.0437	0.0275
58	3.250		0.0787	0.0774	0.5533	0.9109	0.9822	0.6052	0.2769	0.1501	0.0665	0.0293	0.0195
6	4.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	3.600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	4.140		0.9435	0.9375	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	3.600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 73 cont.
Localized Storm Surge Risk Reduction Measures
With Project
2020

Study Area Reach	Target Stage	Geo Tech	Target Stage Annual Exceedance		Long-Term Risk (years)			Conditional Non-Exceedance Probability by Events					
			Median	Expected	10	30	50	0.10	0.04	0.02	0.01	0.004	0.002
1	2.980		0.1022	0.1008	0.6544	0.9587	0.9951	0.4795	0.0841	0.0078	0.0028	0.0015	0.0000
10	6.500	L	0.0066	0.0075	0.0724	0.2019	0.3133	0.9998	0.9998	0.9856	0.8288	0.1407	0.0105
11	6.500	L	0.0286	0.0310	0.2700	0.6110	0.7927	0.9899	0.9082	0.1500	0.0322	0.0029	0.0002
12	6.500	L	0.0286	0.0332	0.2866	0.6369	0.8152	0.9900	0.9059	0.1456	0.0286	0.0022	0.0003
13	4.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	4.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	6.500	L	0.0034	0.0035	0.0346	0.1004	0.1616	0.9995	0.9995	0.9995	0.9995	0.6633	0.1600
16	6.500	L	0.0200	0.0247	0.2211	0.5275	0.7133	0.9790	0.8683	0.5006	0.2671	0.0918	0.0335
17	3.200		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	3.360		0.0709	0.0739	0.5359	0.9001	0.9785	0.7666	0.2006	0.0445	0.0112	0.0032	0.0018
20	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	6.500	L	0.0058	0.0066	0.0645	0.1814	0.2837	0.9996	0.9995	0.9856	0.7760	0.3672	0.2144
22	4.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	4.200		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24	3.070		0.0938	0.0968	0.6387	0.9529	0.9938	0.5688	0.0916	0.0260	0.0076	0.0023	0.0014
25	6.500	L	0.0200	0.0247	0.2211	0.5275	0.7133	0.9790	0.8683	0.5006	0.2671	0.0918	0.0335
26	6.500	L	0.0200	0.0247	0.2211	0.5275	0.7133	0.9790	0.8683	0.5006	0.2671	0.0918	0.0335
27	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
29	3.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	3.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30	6.500	L	0.0071	0.0078	0.0757	0.2103	0.3254	0.9995	0.9995	0.9849	0.8266	0.1050	0.0095
31	6.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
32	4.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
33	3.710		0.0523	0.0519	0.4132	0.7980	0.9304	0.9960	0.3452	0.1357	0.0431	0.0149	0.0098
34	2.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35	2.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
36	6.500	L	0.0058	0.0065	0.0634	0.1783	0.2791	0.9998	0.9996	0.9899	0.7657	0.3831	0.2511
37	6.500	L	0.0071	0.0078	0.0755	0.2098	0.3246	0.9998	0.9998	0.9858	0.8289	0.1017	0.0074
38	4.200		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
39	6.900	L	0.0022	0.0025	0.0243	0.0712	0.1159	0.9995	0.9995	0.9995	0.9995	0.9201	0.4207
4	4.600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40	6.500	L	0.0034	0.0035	0.0346	0.1004	0.1616	0.9995	0.9995	0.9995	0.9995	0.6633	0.1600
41	2.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	6.500	L	0.0286	0.0330	0.2850	0.6345	0.8132	0.9896	0.9069	0.1502	0.0310	0.0027	0.0002
43	4.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
44	2.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
46	6.500	L	0.0062	0.0070	0.0678	0.1900	0.2961	0.9998	0.9997	0.9824	0.7271	0.3570	0.2320
47	2.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	4.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49	4.600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	6.500	L	0.0169	0.0189	0.1734	0.4353	0.6142	0.9995	0.9635	0.6186	0.2093	0.0781	0.0314
50	3.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51	3.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
52	4.800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
53	3.500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54	3.520		0.0677	0.0682	0.5067	0.8799	0.9708	0.8978	0.2221	0.0614	0.0227	0.0113	0.0083
55	6.500	L	0.0050	0.0058	0.0564	0.1599	0.2520	0.9997	0.9997	0.9914	0.8356	0.4177	0.2448
56	6.500	L	0.0058	0.0066	0.0641	0.1801	0.2818	0.9997	0.9997	0.9853	0.7716	0.3678	0.2179
57	3.630		0.0539	0.0614	0.4693	0.8506	0.9579	0.7595	0.4048	0.1965	0.0927	0.0414	0.0273
58	3.250		0.0787	0.0770	0.5512	0.9096	0.9818	0.6121	0.2831	0.1520	0.0732	0.0313	0.0202
6	4.000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	6.500	L	0.0066	0.0075	0.0721	0.2010	0.3121	0.9996	0.9996	0.9848	0.8281	0.1421	0.0124
8	6.500	L	0.0066	0.0075	0.0721	0.2010	0.3121	0.9996	0.9996	0.9848	0.8281	0.1421	0.0124
9	6.500	L	0.0066	0.0075	0.0725	0.2020	0.3135	0.9997	0.9997	0.9856	0.8287	0.1405	0.0104

Table 74
Project Performance by Study Area Reach
Levee Alignment C
Without Project
2070

Study Area Reach	Target Stage	Geo Tech	Target Stage Annual Exceedance		Long-Term Risk (years)			Conditional Non-Exceedance Probability by Events					
			Median	Expected	10.0000	30.0000	50.0000	0.1000	0.0400	0.0200	0.0100	0.0040	0.0020
SA 1	6.2300		0.0857	0.0898	0.6097	0.9405	0.9909	0.6030	0.1602	0.0031	0.0000	0.0000	0.0000
SA 10	6.1500		0.0397	0.0547	0.4304	0.8152	0.9401	0.8949	0.5254	0.0097	0.0027	0.0000	0.0000
SA 11	9.2900		0.0236	0.0233	0.2104	0.5078	0.6931	0.9998	0.9889	0.3481	0.0730	0.0207	0.0122
SA 12	8.0700		0.0382	0.0469	0.3816	0.7636	0.9096	0.9802	0.6079	0.0253	0.0050	0.0021	0.0000
SA 13	7.2300		0.0358	0.0399	0.3344	0.7052	0.8694	0.9875	0.8281	0.0237	0.0068	0.0031	0.0025
SA 14	8.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 15	10.2400		0.0667	0.0709	0.5209	0.8900	0.9748	0.7878	0.2351	0.0238	0.0000	0.0000	0.0000
SA 16	8.4200		0.0336	0.0353	0.3022	0.6603	0.8346	0.9987	0.8391	0.0827	0.0288	0.0136	0.0089
SA 17	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 18	3.4600		0.9675	0.9627	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 19	5.1400		0.1045	0.1012	0.6559	0.9593	0.9952	0.4612	0.0922	0.0000	0.0000	0.0000	0.0000
SA 2	7.1200		0.1398	0.1292	0.7492	0.9842	0.9990	0.3165	0.0495	0.0000	0.0000	0.0000	0.0000
SA 20	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 21	5.0000		0.1685	0.1599	0.8250	0.9946	0.9998	0.1458	0.0101	0.0000	0.0000	0.0000	0.0000
SA 22	5.6100		0.4914	0.4893	0.9988	1.0000	1.0000	0.0146	0.0058	0.0000	0.0000	0.0000	0.0000
SA 23	8.4400		0.0338	0.0356	0.3043	0.6633	0.8371	0.9984	0.9013	0.0398	0.0086	0.0026	0.0019
SA 24	7.0700		0.0551	0.0615	0.4699	0.8510	0.9581	0.8974	0.3353	0.0213	0.0085	0.0044	0.0033
SA 25	4.0700		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 26	4.6500		0.1540	0.1478	0.7980	0.9918	0.9997	0.1359	0.0049	0.0000	0.0000	0.0000	0.0000
SA 27	3.5400		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 28X	4.5200		0.1665	0.1618	0.8288	0.9950	0.9999	0.0864	0.0026	0.0000	0.0000	0.0000	0.0000
SA 28Y	3.5600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 29	6.4500		0.0611	0.0741	0.5371	0.9008	0.9787	0.6809	0.3003	0.0000	0.0000	0.0000	0.0000
SA 29C	5.2300		0.1395	0.1339	0.7626	0.9866	0.9992	0.1952	0.0128	0.0000	0.0000	0.0000	0.0000
SA 3	13.6000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 30	5.0600		0.1436	0.1389	0.7758	0.9887	0.9994	0.1455	0.0039	0.0000	0.0000	0.0000	0.0000
SA 30C	4.3200		0.1820	0.1847	0.8703	0.9978	1.0000	0.0359	0.0000	0.0000	0.0000	0.0000	0.0000
SA 31	6.2400		0.0874	0.0884	0.6036	0.9377	0.9902	0.5680	0.1547	0.0000	0.0000	0.0000	0.0000
SA 31C	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 32	5.5800		0.1320	0.1246	0.7357	0.9815	0.9987	0.2755	0.0338	0.0000	0.0000	0.0000	0.0000
SA 33	5.9800		0.1070	0.1033	0.6640	0.9621	0.9957	0.4407	0.0819	0.0027	0.0000	0.0000	0.0000
SA 34	5.1500		0.1631	0.1541	0.8124	0.9934	0.9998	0.1505	0.0148	0.0000	0.0000	0.0000	0.0000
SA 35	5.1500		0.1628	0.1541	0.8124	0.9934	0.9998	0.1553	0.0162	0.0000	0.0000	0.0000	0.0000
SA 36	5.9700		0.1075	0.1043	0.6676	0.9633	0.9959	0.4435	0.0805	0.0038	0.0000	0.0000	0.0000
SA 37	11.3900		0.0175	0.0168	0.1555	0.3977	0.5705	0.9997	0.9997	0.5809	0.2455	0.1021	0.0583
SA 38	5.5500		0.1492	0.1363	0.7690	0.9877	0.9993	0.2672	0.0393	0.0044	0.0027	0.0020	0.0000
SA 39	8.0500		0.0368	0.0423	0.3507	0.7263	0.8846	0.9873	0.6508	0.0699	0.0268	0.0140	0.0100
SA 39C	9.6200		0.0271	0.0262	0.2329	0.5486	0.7344	0.9997	0.9615	0.2294	0.0909	0.0425	0.0276
SA 4	11.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 40P	3.5000		0.9989	0.9989	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 41	4.7400		0.1968	0.2175	0.9140	0.9994	1.0000	0.0736	0.0057	0.0000	0.0000	0.0000	0.0000
SA 41P	5.0500		0.1392	0.1344	0.7638	0.9868	0.9993	0.1833	0.0100	0.0000	0.0000	0.0000	0.0000
SA 42P	6.1700		0.0951	0.0940	0.6272	0.9482	0.9928	0.5257	0.1167	0.0019	0.0000	0.0000	0.0000
SA 43P	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 44C	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 5	11.6600		0.8540	0.8509	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 6	12.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 7	7.9000		0.0359	0.0402	0.3367	0.7081	0.8716	0.9897	0.7947	0.0261	0.0070	0.0030	0.0024
SA 8	9.3700		0.0298	0.0294	0.2578	0.5911	0.7747	0.9998	0.9997	0.0329	0.0023	0.0000	0.0000
SA 9	5.6400		0.0656	0.0738	0.5357	0.8999	0.9784	0.7281	0.2632	0.0034	0.0000	0.0000	0.0000

Table 74 cont.
Levee Alignment C
With Project
2070

Study Area Reach	Target Stage	Geo Tech	Target Stage Annual Exceedance		Long-Term Risk (years)			Conditional Non-Exceedance Probability by Events					
			Median	Expected	10.0000	30.0000	50.0000	0.1000	0.0400	0.0200	0.0100	0.0040	0.0020
SA 1	5.4800		0.8360	0.8345	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 10	4.7100		0.0078	0.0080	0.0767	0.2129	0.3290	0.9996	0.9996	0.9996	0.6860	0.1637	0.0496
SA 11	7.6000		0.0403	0.0416	0.3461	0.7204	0.8804	0.9977	0.4958	0.1890	0.0968	0.0452	0.0277
SA 12	6.5100		0.6189	0.6192	0.9999	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 13	5.7400		0.0678	0.0687	0.5094	0.8819	0.9716	0.7980	0.2121	0.1191	0.0654	0.0109	0.0024
SA 14	8.1000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 15	9.3700		0.8521	0.8502	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 16	5.3400		0.9221	0.9147	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 17	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 18	3.5500		0.0082	0.0080	0.0769	0.2134	0.3297	0.9997	0.9997	0.9997	0.7405	0.0776	0.0153
SA 19	4.9500		0.0001	0.0001	0.0010	0.0031	0.0052	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
SA 2	5.8000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 20	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 21	4.0100		0.1733	0.1723	0.8491	0.9966	0.9999	0.0576	0.0037	0.0000	0.0000	0.0000	0.0000
SA 22	5.1300		0.9821	0.9771	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 23	6.4000		0.7989	0.7982	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 24	6.5100		0.0583	0.0606	0.4646	0.8466	0.9560	0.8991	0.2452	0.0992	0.0195	0.0035	0.0000
SA 25	4.0800		0.4751	0.4716	0.9983	1.0000	1.0000	0.0059	0.0000	0.0000	0.0000	0.0000	0.0000
SA 26	4.2200		0.0004	0.0011	0.0105	0.0312	0.0514	0.9998	0.9998	0.9998	0.9980	0.9466	0.8295
SA 27	3.0600		0.0070	0.0107	0.1024	0.2768	0.4173	0.9997	0.9788	0.8094	0.6296	0.3306	0.2015
SA 28X	4.0400		0.0007	0.0015	0.0148	0.0438	0.0720	0.9998	0.9998	0.9995	0.9935	0.9017	0.7495
SA 28Y	3.6400		0.0018	0.0032	0.0314	0.0912	0.1473	0.9998	0.9998	0.9898	0.9457	0.7227	0.5232
SA 29	5.1700		0.0001	0.0005	0.0054	0.0160	0.0265	0.9998	0.9998	0.9998	0.9998	0.9995	0.9922
SA 29C	3.5000		0.8639	0.8610	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 3	13.6000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 30	4.1700		0.0005	0.0012	0.0119	0.0353	0.0581	0.9997	0.9997	0.9996	0.9963	0.9341	0.8082
SA 30C	4.2900		0.0003	0.0009	0.0092	0.0275	0.0454	0.9998	0.9998	0.9998	0.9989	0.9590	0.8562
SA 31	5.9600		0.0001	0.0002	0.0024	0.0073	0.0121	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
SA 31C	2.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 32	4.7800		0.0003	0.0006	0.0064	0.0190	0.0315	0.9998	0.9998	0.9998	0.9998	0.9896	0.9338
SA 33	5.4600		0.0001	0.0001	0.0010	0.0030	0.0050	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
SA 34	4.7700		0.0010	0.0031	0.0304	0.0885	0.1431	0.9998	0.9954	0.9799	0.9273	0.7760	0.6418
SA 35	4.8800		0.0001	0.0004	0.0038	0.0115	0.0191	0.9997	0.9997	0.9997	0.9997	0.9997	0.9988
SA 36	5.5100		0.0001	0.0002	0.0017	0.0052	0.0086	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
SA 37	2.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 38	5.3200		0.0003	0.0004	0.0036	0.0108	0.0180	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
SA 39	6.5600		0.0001	0.0002	0.0022	0.0066	0.0109	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
SA 39C	8.2200		0.0001	0.0002	0.0020	0.0061	0.0102	0.9995	0.9995	0.9995	0.9995	0.9995	0.9995
SA 4	11.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 40P	3.5600		0.0022	0.0037	0.0364	0.1051	0.1690	0.9997	0.9997	0.9836	0.9256	0.6769	0.4781
SA 41	4.5600		0.0001	0.0005	0.0051	0.0152	0.0252	0.9998	0.9998	0.9998	0.9998	0.9965	0.9787
SA 41P	5.0300		0.0001	0.0005	0.0050	0.0149	0.0247	0.9998	0.9998	0.9998	0.9998	0.9987	0.9859
SA 42P	6.1400		0.0001	0.0004	0.0043	0.0128	0.0213	0.9998	0.9997	0.9997	0.9997	0.9997	0.9997
SA 43P	2.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 44C	1.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 5	11.7200		0.7625	0.7615	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 6	12.1000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SA 7	5.9200		0.1958	0.2049	0.8991	0.9990	1.0000	0.0522	0.0035	0.0000	0.0000	0.0000	0.0000
SA 8	8.0200		0.0265	0.0353	0.3022	0.6603	0.8346	0.9450	0.7091	0.3644	0.1318	0.0208	0.0037
SA 9	4.2000		0.2056	0.2130	0.9089	0.9992	1.0000	0.0253	0.0000	0.0000	0.0000	0.0000	0.0000

Table 74 cont.
Levee Alignment C
With Project
2070

Study Area Reach	Target Stage	Geo Tech	Target Stage Annual Exceedance		Long-Term Risk (years)			Conditional Non-Exceedance Probability by Events					
			Median	Expected	10.0000	30.0000	50.0000	0.1000	0.0400	0.0200	0.0100	0.0040	0.0020
1.0000	3.0200		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10.0000	10.0400		0.0173	0.0165	0.1533	0.3930	0.5649	0.9997	0.9997	0.6115	0.2116	0.0635	0.0298
11.0000	4.8800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12.0000	10.0200		0.0178	0.0173	0.1604	0.4082	0.5829	1.0000	0.9996	0.6738	0.0560	0.0000	0.0000
13.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.0000	10.8800		0.0138	0.0140	0.1316	0.3452	0.5062	0.9997	0.9997	0.7332	0.3297	0.0959	0.0435
16.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2.0000	4.2700		0.1739	0.1683	0.8417	0.9960	0.9999	0.1146	0.0063	0.0000	0.0000	0.0000	0.0000
20.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
22.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24.0000	3.0800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25.0000	11.0100		0.0131	0.0133	0.1252	0.3306	0.4877	1.0000	0.9996	0.9317	0.2343	0.0090	0.0000
26.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
27.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
29.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
31.0000	6.5000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
32.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
33.0000	4.0900		0.1912	0.2039	0.8978	0.9989	1.0000	0.0807	0.0028	0.0000	0.0000	0.0000	0.0000
34.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
36.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
37.0000	10.0400		0.0179	0.0169	0.1570	0.4010	0.5744	0.9997	0.9997	0.5813	0.1991	0.0610	0.0299
38.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
39.0000	11.0100		0.0132	0.0135	0.1269	0.3344	0.4926	0.9997	0.9997	0.7607	0.3553	0.1054	0.0481
4.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40.0000	11.0100		0.0131	0.0135	0.1266	0.3338	0.4919	0.9997	0.9997	0.7617	0.3558	0.1058	0.0484
41.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42.0000	10.4400		0.0152	0.0152	0.1417	0.3678	0.5343	1.0000	0.9996	0.8518	0.1237	0.0025	0.0000
43.0000	9.4200		0.0212	0.0205	0.1875	0.4636	0.6459	1.0000	0.9998	0.3424	0.0144	0.0000	0.0000
44.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
46.0000	5.1400		0.1041	0.0998	0.6504	0.9573	0.9948	0.4675	0.0974	0.0022	0.0000	0.0000	0.0000
47.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
52.0000	10.3200		0.0159	0.0157	0.1464	0.3781	0.5469	1.0000	0.9996	0.8140	0.1029	0.0024	0.0000
53.0000	9.1800		0.0222	0.0209	0.1906	0.4697	0.6525	0.9997	0.9997	0.3632	0.1023	0.0288	0.0147
54.0000	3.6100		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55.0000	7.2200		0.0325	0.0337	0.2904	0.6426	0.8200	0.9954	0.9385	0.0484	0.0107	0.0025	0.0014
56.0000	5.9700		0.0462	0.0599	0.4608	0.8432	0.9544	0.8505	0.4333	0.0083	0.0024	0.0000	0.0000
57.0000	3.5600		0.4469	0.4459	0.9973	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
58.0000	3.2800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7.0000	3.7000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8.0000	6.0300		0.0433	0.0566	0.4413	0.8256	0.9455	0.9056	0.4623	0.0113	0.0032	0.0000	0.0000
9.0000	10.2800		0.0159	0.0155	0.1446	0.3741	0.5420	0.9997	0.9997	0.6712	0.2496	0.0766	0.0367

Table 74 cont.
Levee Alignment C
With Project
2070

Study Area Reach	Target Stage	Geo Tech	Target Stage Annual Exceedance		Long-Term Risk (years)			Conditional Non-Exceedance Probability by Events					
			Median	Expected	10.0000	30.0000	50.0000	0.1000	0.0400	0.0200	0.0100	0.0040	0.0020
1.0000	2.9800		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10.0000	6.5000	L	0.0372	0.0479	0.3876	0.7704	0.9139	0.9785	0.7047	0.0185	0.0043	0.0016	0.0010
11.0000	6.5000	L	0.0385	0.0553	0.4337	0.8184	0.9418	0.8287	0.7765	0.0000	0.0000	0.0000	0.0000
12.0000	6.5000	L	0.0385	0.0667	0.4983	0.8737	0.9682	0.8146	0.7647	0.0000	0.0000	0.0000	0.0000
13.0000	4.8000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14.0000	4.8000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.0000	6.5000	L	0.0374	0.0543	0.4277	0.8126	0.9386	0.9462	0.7020	0.0125	0.0033	0.0011	0.0005
16.0000	6.5000	L	0.0380	0.0681	0.5058	0.8793	0.9705	0.8871	0.8523	0.0000	0.0000	0.0000	0.0000
17.0000	3.2000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18.0000	2.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19.0000	2.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2.0000	3.3600		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20.0000	2.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.0000	6.5000	L	0.0372	0.0525	0.4166	0.8014	0.9324	0.9523	0.7071	0.0176	0.0041	0.0015	0.0005
22.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23.0000	4.2000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24.0000	3.0700		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25.0000	6.5000	L	0.0380	0.0683	0.5069	0.8801	0.9708	0.8844	0.8501	0.0000	0.0000	0.0000	0.0000
26.0000	6.5000	L	0.0380	0.0681	0.5058	0.8793	0.9705	0.8874	0.8533	0.0000	0.0000	0.0000	0.0000
27.0000	2.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0000	2.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
29.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3.0000	3.5000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30.0000	6.5000	L	0.0373	0.0506	0.4048	0.7891	0.9253	0.9776	0.7077	0.0170	0.0039	0.0014	0.0008
31.0000	6.8000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
32.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
33.0000	3.7100		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
34.0000	2.5000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35.0000	2.5000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
36.0000	6.5000	L	0.0372	0.0525	0.4166	0.8014	0.9324	0.9523	0.7071	0.0176	0.0041	0.0015	0.0005
37.0000	6.5000	L	0.0373	0.0483	0.3905	0.7736	0.9159	0.9761	0.7032	0.0174	0.0044	0.0018	0.0011
38.0000	4.2000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
39.0000	6.9000	L	0.0349	0.0474	0.3849	0.7673	0.9119	0.9829	0.8597	0.0235	0.0058	0.0017	0.0010
4.0000	4.6000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40.0000	6.5000	L	0.0374	0.0543	0.4277	0.8125	0.9386	0.9462	0.7020	0.0125	0.0033	0.0011	0.0005
41.0000	2.5000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42.0000	6.5000	L	0.0385	0.0698	0.5149	0.8858	0.9731	0.8144	0.7641	0.0000	0.0000	0.0000	0.0000
43.0000	4.8000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
44.0000	2.5000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45.0000	2.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
46.0000	6.5000	L	0.0373	0.0454	0.3718	0.7520	0.9021	0.9510	0.7065	0.0168	0.0039	0.0016	0.0006
47.0000	2.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49.0000	4.6000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5.0000	6.5000	L	0.0374	0.0604	0.4635	0.8456	0.9556	0.9340	0.7995	0.0016	0.0002	0.0000	0.0000
50.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51.0000	3.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
52.0000	4.8000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
53.0000	3.5000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54.0000	3.5200		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55.0000	6.5000	L	0.0373	0.0460	0.3755	0.7564	0.9050	0.9509	0.7056	0.0145	0.0035	0.0012	0.0005
56.0000	6.5000	L	0.0372	0.0450	0.3693	0.7491	0.9002	0.9556	0.7140	0.0190	0.0043	0.0012	0.0004
57.0000	3.6300		0.1979	0.2485	0.9425	0.9998	1.0000	0.0387	0.0000	0.0000	0.0000	0.0000	0.0000
58.0000	3.2500		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6.0000	4.0000		0.9990	0.9990	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7.0000	6.5000	L	0.0372	0.0448	0.3674	0.7469	0.8987	0.9783	0.7079	0.0203	0.0052	0.0021	0.0013
8.0000	6.5000	L	0.0372	0.0442	0.3640	0.7427	0.8959	0.9783	0.7079	0.0203	0.0052	0.0021	0.0013
9.0000	6.5000	L	0.0372	0.0499	0.4008	0.7848	0.9227	0.9789	0.7082	0.0185	0.0040	0.0015	0.0009

Annex A

West Shore Lake Pontchartrain (WSLP) Louisiana Hurricane and Storm Damage Risk Reduction (HSDRR) Study Reach ID MAP

Amite River Diversion Canal
Blind River
Lake Maurepas
Acension Parish
St. John The Baptist Parish
St. James Parish
Romeville
Lutcher/Gramercy
Reserve
Laplace
Convent
Mississippi River
Lac Des Allemands

RSA 31, RSA 19, RSA 45, RSA 22, RSA 20, RSA 18, RSA 32, RSA 47, RSA 48, RSA 06, RSA 23, RSA 38, RSA 05, RSA 33, RSA 49, RSA 34, RSA 04, RSA 25, RSA 35, RSA 16, RSA 26, RSA 40, RSA 41, RSA 39, RSA 17, RSA 15, RSA 44, RSA 29, RSA 24, RSA 28, RSA 27, RSA 56, RSA 55, RSA 51, RSA 14, RSA 50, RSA 13, RSA 43, RSA 11, RSA 07, RSA 02, RSA 10, RSA 12, RSA 42, RSA 01, RSA 21, RSA 03, RSA 46, RSA 36, RSA 37, RSA 53, RSA 54, RSA 08, RSA 30, RSA 09

SA 40P, SA 41P, SA 31C, SA 42P, SA 31, SA 32, SA 30C, SA 33, SA 34, SA 41, SA 43P, SA 35, SA 36, SA 37, SA 38, SA 24, SA 39, SA 39C, SA 16, SA 25, SA 17, SA 8, SA 7, SA 6, SA 15, SA 14, SA 23, SA 22, SA 21, SA 20, SA 19, SA 18, SA 29, SA 26, SA 27, SA 28X, SA 28Y, SA 29C, SA 30, SA 9, SA 10, SA 11, SA 12, SA 13, SA 3, SA 4, SA 5, SA 1, SA 2

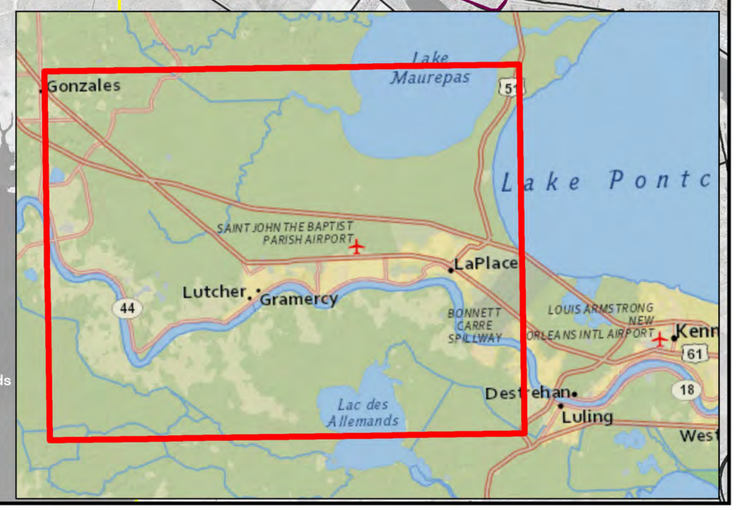
Legend

Levee Features

- Drainage Structure, T-Wall
- Gated Railroad Crossing
- Gated Roadway Structure
- Roadway Crossing Over Levee
- Pump Station, Drainage Structure, T-Wall
- T-Wall
- Structures included in Flood Proofing
- Flap Gates
- Polder 1 (Lutcher/Gramercy)
- Polder 3 (Grand Point North)
- Economic/H&H Reaches
- Parish Boundary

0 1.25 2.5 5 7.5 10 Miles

N



West Shore Lake Pontchartrain, Louisiana
Feasibility Report
Annex B: Other Social Effects Appendix

I. INTRODUCTION 2
Purpose 2
Study Area 2
Overview of Other Social Effects 2
Organization of Appendix 2
II. OTHER SOCIAL EFFECTS STUDY AREA CHARACTERISTICS 3
Socioeconomic Characteristics of the Study Area 3
Population and Households. 3
Employment. 4
Social Profile of the Study Area 5
Health and Safety 5
Social Connectedness 5
Leisure and Recreation 6
Social Vulnerability/Resiliency 6
III. OTHER SOCIAL EFFECTS EVALUATION OF ALTERNATIVES 8
Social Implications of the Alternatives 8
Population and Housing 9
Health and Safety 10
Social Vulnerability and Resiliency 11
Summary of Alternative Analysis 11
References 12

I. INTRODUCTION

This appendix presents a socioeconomic evaluation of the alternatives being considered for storm surge risk reduction for the West Shore of Lake Pontchartrain study area, which includes portions of three parishes in the state of Louisiana. It was prepared in accordance with Engineering Regulation (ER) 1105-2-100, Planning Guidance Notebook, ER 1105-2-101, Planning Guidance, Risk Analysis for Flood Damage Reduction Studies, and Engineering Circular (EC) 1105-2-409.

Purpose

The purpose of this appendix is to describe the Other Social Effects (OSE) account of the the project. The OSE account considers the potential social ramifications of Corps actions so that decision makers and stakeholders are able to evaluate the social implications of each alternative and choose an alternative that will be judged as complete, effective, and fair.

Study Area

The study area is located in Louisiana about 30 miles west of the city of New Orleans and includes parts of St. Charles, St. John the Baptist, and St. James Parishes. Communities in the study area include the Montz, Laplace, Gramercy, Lutcher, Grand Point, Reserve, Convent and Romeville. Parts of the parishes have historically suffered hurricane and tropical storm surge damages due to insufficient hurricane and storm damage risk reduction features. The impact of preparing for, mitigating, and recovering from these damages has placed a significant physical and emotional burden on individuals and has been devastating for impacted communities. The goals of the proposed project are to reduce property damage risks in the study area from the effects of hurricane/tropical storm surges.

Overview of Other Social Effects

While federal water resources planning guidance has long called for an examination of the social effects associated with USACE water resources projects, the tendency has been to discount the social impacts of Corps projects during the planning process and focus instead on the economic analysis (USACE, 2008). EC 1105-2-409, however, states that "all Corps planning studies will evaluate, display and compare the full range of alternative plans' effects across all four Principles and Guidelines' accounts (National Economic Development (NED), Regional Economic Development (RED), Environmental Quality (EQ), and Other Social Effects (OSE)" (USACE, 2008 pg. 4).

The OSE account ensures that adequate attention is paid to the beneficial and adverse social effects of Corps projects during the planning process. This appendix follows the guidance set forth by the USACE Institute for Water Resources (IWR) in the Handbook on Applying "Other Social Effects" Factors in Corps of Engineers Water Resources Planning (USACE, 2008). The handbook describes the procedures for analyzing and using OSE criteria in the planning process and identifies social factors that affect individual and group definitions of satisfaction and well-being.

Organization of Appendix

The OSE appendix is organized as follows:

- Section 1 provides an introduction to OSE.
- Section 2 describes the existing and future without-project socioeconomic characteristics and other social factors of the study area.
- Section 3 provides an OSE analysis of the project alternatives.

II. OTHER SOCIAL EFFECTS STUDY AREA CHARACTERISTICS

This section provides a description of the existing and future without-project socioeconomic characteristics and other social factors of the study area.

Socioeconomic Characteristics of the Study Area

In this section, socioeconomic data for St. Charles, St. John the Baptist, and St. James Parishes are presented in order to provide a context from which to evaluate the potential social impacts of the proposed project.

Population and Households.

Population characteristics such as size and change constitute important areas of consideration in that they determine consumption patterns, land uses, and future development patterns. Table 1 displays the population in each of the parishes for the years 1970, 1980, 1990, 2000, and 2010, as well as projections for the year 2020 and the year 2070, the years that were modeled and used to calculate damages and benefits. Population projections are based on the Moody's County Forecast Database, which has population projections to the year 2038. Moody's projections were extended by New Orleans District from the year 2030 to the year 2080 based on the growth rate forecasted by Moody's for the years 2018 through 2038. As shown in Table 1, St. Charles, St. James and St. John Parishes experienced a steady increase in population between 1980 and 2010.

Table 1: Parish-wide populations (in 1000s). (U.S. Census 2013)

Parish	**1970**	**1980**	**1990**	**2000**	**2010**
St. Charles	29.5	37.5	42.5	48.2	52.8
St. John the Baptist	23.8	32.3	40.1	43.1	45.9
St. James	19.7	21.6	20.8	21.4	22.1
Total	**73.0**	**91.4**	**103.4**	**112.7**	**120.8**

According to U.S. Census data, the population of St. Charles Parish was 48,200 in 2000 and 52,800 in 2010, an increase of 4,600 residents. During the same time, the population of St. John the Baptist Parish increased from 43,100 to 45,900, an increase of 2,800 residents. During the same period, the population of St. James Parish increased from 21,400 to 22,100, an increase of 700 residents.

Parish populations are projected to maintain this steady growth, with St. Charles Parish expected to have roughly 56,200 residents in 2020 and approximately 65,500 residents in the year 2070. St. John the Baptist Parish is expected to grow with an estimated population of roughly 51,700 in 2020 and 60,200 in 2070. The total population in the study area is projected to grow to 95,900 by 2080.

Table 2: Number of households in study area (in 1000s). (U.S. Census 2013)

Parish	**1970**	**1980**	**1990**	**2000**	**2010**	**2020**	**2080**
St. Charles	7.59	11.6	14.4	16.5	17.2	18.3	22.0
St. James	4.63	6.1	6.4	7.0	6.9	7.2	8.7
St. John the Baptist	5.77	9.4	12.7	14.3	15.1	16.3	19.6
Total	**17.99**	**27.1**	**33.5**	**37.8**	**39.2**	**41.8**	**50.3**

Table 2 shows the number of households in each parish in 1970, 1980, 1990, 2000, and 2010 and projections for the years 2020 and 2080. The projected number of households was based on Moody's County Forecast Database and extended from the year 2038 to 2080 by the New Orleans District based on the growth rate forecasted by Moody's for the years 2018 through 2038.
The total number of households in the three Parishes experienced a steady increase between 1970 and 2010, which parallels the growth in population. This increase, which was commensurate with the population growth experienced by the entire Gulf Coast region during the same period, can be attributed to increases in the petrochemical industry and area ports. Similar to the projected population growth in the area, the number of households is expected to continue increasing through the year 2080. St. Charles Parish is projected to have approximately 18,300 households in the year 2020, while St. John the Baptist Parish is projected to have 16,300 households, and St. James Parish is projected to have 7,200 households. By the year 2080, the number of households in St. Charles Parish is expected to reach approximately 22,000 while the number in St. John the Baptist Parish is expected to reach to approximately 19,600 and St. James Parish is expected to reach 8,700. In total, the parishes are projected to have approximately 50,200 households in the year 2080.

Employment.
Table 3 shows the total non-farm employment by parish for the years 1970, 1980, 1990, 2000, 2010. Employment trends in the area have historically moved with the activity of the petrochemical industry, river ports and agriculture.

Table 3: Historical parish-wide non-farm employment (in 1000s). (Moody's 2013)

Parish	**1970**	**1980**	**1990**	**2000**	**2010**
St. Charles	9.0	18.1	18.5	20.1	24.3
St. John the Baptist	5.4	9.8	9.4	7.6	8.1
St. James	4.2	9.4	11.0	13.4	15.0
Total	**18.5**	**37.2**	**39.0**	**41.1**	**47.4**

In addition to the petrochemical industry, there are two other sectors of the economy that are important to the region: ports and agriculture. The Port of South Louisiana is the largest volume port in the western hemisphere. The area grows and processes sugarcane and other farm products that are used both domestically and abroad.

Social Profile of the Study Area

This section provides a baseline profile of the social characteristics of the study area. Data for the profile are from a variety of sources including 2010 U.S. Census records, the 2006-2010 U.S. Census Bureau's American Community Survey (ACS) estimates, ESRI data, and aerial photography. Baseline characteristics are considered the existing and future-without project conditions.

Health and Safety

Severe flood events threaten the health and safety of residents living in the study area. Loss of life, injury, and post flood health hazards may occur in the event of catastrophic flooding. For example, while the study area was not directly impacted by Hurricane Katrina, the Louisiana Recovery Authority estimated (as of November 2006) that 1,464 fatalities occurred associated with Hurricane Katrina with 135 more residents declared missing. Hurricanes Gustav and Ike were less costly in terms of lives lost, but still claimed 98 deaths. When facilities that provide critical care or emergency services are impacted by flood events, residents are at an even greater risk for experiencing negative health outcomes. Hurricanes reduce the previous availability of health facilities and services and require additional fire and police protection. During storms, some police stations are required to relocate because of flooding. In addition to the damages to hospitals, police stations, and fire stations, many employees providing related services lost their homes reducing the staff needed to operate health and safety services.

The number of medical facilities, police stations, and fire stations located in the study area were obtained using 2010 ESRI data (latest year available).

Medical Care Facilities

There are no hospitals, nursing homes, or health care service facilities in the part of St. Charles Parish included in the study area. St. John the Baptist Parish has 8 medical care facilities (e.g., 2 hospitals, 1 Outpatient Clinic, and 5 nursing homes). St. James Parish has 4 medical care facilities.

Police Stations

St. Charles Parish has no police stations in the study area, St. John the Baptist Parish has 2 police stations, and St. James Parish has 3 police stations/sheriff's offices, according to ESRI data.

Fire Stations

There are 23 fire stations located in the study area; 1 in St. Charles Parish, 12 in St. John the Baptist Parish, and 10 in St. James Parish.

Social Connectedness

The degree to which communities are able to instill a shared sense of belonging and purpose among residents is in large part determined by the community's civic infrastructure. The presence of social institutions such as libraries, places of worship, and schools provide residents an opportunity for civic participation and engagement which allows residents to come together and work toward a common goal. The number of libraries, places of worship, and schools located within the study area were obtained using 2010 ESRI data (latest year available).

Civic Infrastructure

According to Google Earth's Mapping data and individual parish governmental websites, the portion of St. Charles Parish in the study area has no libraries, 1 place of worship, and no schools.

The data shows 3 libraries, 32 places of worship, and 19 schools within the study area in St. John the Baptist Parish. St. James Parish has 1 library, 11 places of worship, and 6 schools located in the study area

Leisure and Recreation

Having personal leisure time available and having access to recreational areas contributes to residents' quality of life and is therefore an important aspect of well-being. The number of recreational areas within the study area was obtained using individual parish governmental websites.

Recreational Areas

St. Charles Parish has 1 recreational area located in the study area, Montz Park. St. John the Baptist Parish has 8 recreational areas in the study area; Regala Park; Emily C. Watkins Park; Cambridge Park; Hwy 51 Park; Stephanie Wilking Park; Greenwood Park; Belle Pointe Park and Ezekiel Jackson Park. St. James Parish has 5 recreational areas in the study area; St. James Parish Fitness Center; Gramercy Park; Lutcher Park; Paulina Park; and Romeville Park.

Recreational fishing and hunting are very important in the area. The high quality of the recreational fishery, especially an abundance of freshwater and estuarine species, has made this an important leisure activity for residents. Inland saltwater fish species, crabs, and shrimp are available in nearby lakes. Game species hunted in the area include waterfowl, deer, rabbit, and squirrels.

Social Vulnerability/Resiliency

The devastation of Hurricane Katrina brought attention to the salience of the related concepts of social vulnerability and resiliency when evaluating water resources projects (USACE, 2008). Social vulnerability is a characteristic of groups or communities that limits or prevents their ability to withstand adverse impacts from hazards to which they are exposed. Resiliency, in turn, refers to the ability of groups or communities to cope with and recover from adverse events. The factors that contribute to vulnerability often reduce the ability of groups or communities to recover from a disaster; therefore, more socially vulnerable groups or communities are typically less resilient.
Several factors have been shown to contribute to an area's vulnerability/resiliency, including poverty, racial/ethnic composition, education levels and proportion of the population over the age of 65.

Poverty Rate

High poverty rates negatively impact the social welfare of residents and undermine the community's ability to assist residents in times of need. The 2006-2010 U.S. Census data indicate that 13 percent of the population of St. Charles Parish, 15 percent of the population in St. John the Baptist Parish and 15 percent of the population in St. James Parish fell below the poverty line. In contrast, 18.1 percent of the population in the state of Louisiana and 13.8 percent in the nation overall fell below the poverty line during the same period.

Table 4: St. Charles Parish communities percent minority and low income.

	St. Charles Parish*	**Montz**
Total Population	52,880	1,918
% Minority	35%	22%

% Low Income	13%	0%

*Includes total parish percent minority and low income.

Table 5: St. John the Baptist Parish communities percent minority and low income.

	St. John the Baptist Parish*	Laplace	Reserve	Garyville
Total Population	45,824	29,872	9,766	2,811
% Minority	61%	59%	65%	54%
% Low Income	15%	9%	20%	8%

*Includes total parish percent minority and income.

Table 6: St. James Parish communities percent minority and low income.

	St. James Parish*	Gramercy	Lutcher	Grand Point	Convent
Total Population	22,102	3,613	3,559	2,473	711
% Minority	53%	49%	54%	27%	69%
% Low Income	15%	13%	21%	8%	10%

*Includes total parish population demographics.

Racial / Ethnic Composition

Race/ethnicity plays an important role in the everyday lives of Americans. Unequal access to social resources and language barriers may affect preparing for and recovering from flood events for certain groups. Tables 4, 5, and 6 show the racial and ethnic characteristics of the Parishes, according to the 2010 U.S. Census. In St. John the Baptist and St. James Parishes, the majority of the population is minority. In St. Charles Parish the majority of the population is non-minority.

Education Attainment

Education attainment has important implications for the social vulnerability/resiliency of communities. More educated individuals have less difficulty accessing information and navigating the sometimes complex process of recovery after flood events (e.g., obtaining government assistance, insurance claims, permits, etc.) According to 2006-2010 ACS data, the percentage of the population age 25 and older in St. Charles Parish with a high school diploma is 86.3 percent and 20 percent have a bachelor's degree or higher. Similarly, 82.2 percent of the population 25 and older in St. John the Baptist Parish has a high school diploma and 12.7 percent have a bachelor's degree or higher. In St. James Parish 82.2 percent of the population 25 and older has a high school diploma and 12.7 percent have a bachelor's degree or higher. In Louisiana 81.0% have a high school diploma and 20.9% have a bachelor's degree or higher and the nation overall 85.0% have a high school diploma and 27.9% have a bachelor's degree or higher.

Age

Age is another important factor to consider when examining the social vulnerability/resiliency of a community. For example, elderly residents may have special needs or mobility issues and require

more social resources before, during, and after flood events. According to 2010 U.S. Census data, the proportion aged 65 and older in St. Charles Parish is 10.7 percent, in St. John the Baptist Parish is 11.4 percent, and 14.1 percent in St. James Parish. The state of Louisiana and the nation overall have roughly the same proportion of the population over the age of 65 (12.3% and 13.0%, respectively).

Social Vulnerability Index

The University of South Carolina's Hazards and Vulnerability Research Institute created an index that compares the social vulnerability of U.S. counties/parishes to environmental hazards. The variables in the index are based on previous research which has found that certain characteristics (e.g., poverty, racial/ethnic composition, educational attainment, and proportion over the age of 65) contribute to a community's vulnerability when exposed to hazards. According to the IWR OSE handbook (USACE, 2008), the Social Vulnerability Index (SoVI®) is a valuable tool that can be used in the planning process to identify areas that are socially vulnerable and whose residents may be less able to withstand adverse impacts from hazards.

The SoVI® is a comparative measure of social vulnerability for all counties/parishes in the U.S., with higher scores indicating more social vulnerability than lower scores. St. Charles Parish has a SoVI® 2005-09 score of -1.20 (0.29 national percentile), St. John the Baptist Parish has a SoVI® 2005-09 score of -1.20 (0.29 national percentile), and St. James Parish has a SoVI® 2005-09 score of -1.08 (0.31 national percentile). Stated another way, St. Charles and St. John the Baptist Parishes are less socially vulnerable than roughly 70 percent of counties/parishes in the U.S. In comparison, Orleans Parish-known for enduring levels of high poverty—has a SoVI® 2005-09 score of 2.06 with only 18 percent of counties/parishes in the nation ranked more socially vulnerable.

The study area's social vulnerability, however, is expected to increase over time if subsidence and sea level rise continue to occur, and the population in the study area increases as it is projected to do. The absolute number of socially vulnerable people (e.g., low-income, minority, less-educated, and over the age of 65) at risk for flood events will increase. This, in turn, may lead to an increased burden placed on local, state, and federal agencies to ensure that these socially vulnerable populations have access to resources before, during, and after flood events.

III. OTHER SOCIAL EFFECTS EVALUATION OF ALTERNATIVES

Social Implications of the Alternatives

This section provides an OSE analysis of the project alternatives. The evaluation is based on the differential impact that each alternative is expected to have on the socioeconomic characteristics and other social factors of the study area presented in the previous section.

The analysis was conducted based on a comparison of without-project conditions to each of three alternative plans. The performance of the alternatives is summarized generally as follows:

- No Action - provides no additional risk reduction to any study area communities.
- Alternative A – reduces risk to St. Charles and St. John the Baptist communities with a levee system and to parts of St. James Parish through earthen berms, culvert flap gates, elevating structures, and limited property acquisitions.
- Alternative C – provides the same risk reduction as Alternative A.
- Alternative D – reduces risk to three parishes with a levee system.

Table 7 shows the risk reduction of the No Action Alternative, and Alternatives A, C, and D.

Table 7: Performance comparison of plans

Alternative	**Structures in the System**	**Communities in the System**
No Action	0	None
A	16,919	Montz, Laplace, Reserve, Garyville
C	16,919	Montz, Laplace, Reserve, Garyville
D	21,840	Montz, Laplace, Reserve, Garyville, Lutcher, Grammercy, Grand Point

Population and Housing

No Action Alternative

Under this scenario all structures in the study area would remain vulnerable to hurricane/tropical storm surge impacts. The No Action Alternative would not reduce risk in the study area. Risks would increase over time due to sea level rise. A catastrophic flood would result in severe negative impacts to residents and significantly damage structures. Communities would not be able to benefit from discounted flood insurance premiums offered by the National Flood Insurance Program (NFIP) should the flood rate insurance maps be updated to reflect increases in flood risk over time due to sea level rise.

Alternative A

Under this alternative, 16,919 structures would be at a reduced risk for adverse impacts as a result of 1% ACE events. Additionally, many residents in these communities would be able to benefit from discounted flood insurance premiums offered by the NFIP (should the flood insurance rate maps be updated to reflect increases in flood risk over time due to sea level rise).

Alternative C

Under this alternative, 16,919 structures would be at a reduced risk for adverse impacts as a result of 1% ACE events. Additionally, many residents in these communities would be able to benefit from discounted flood insurance premiums offered by the NFIP (should the flood insurance rate maps be updated to reflect increases in flood risk over time due to sea level rise).

Alternative D

Under this alternative, 21,840 structures would be at a reduced risk for adverse impacts as a result of 1% ACE events. Additionally, many residents in these communities would be able to benefit from discounted flood insurance premiums offered by the NFIP (should the flood insurance rate maps be updated to reflect increases in flood risk over time due to sea level rise).

Health and Safety

No Action Alternative
All medical care facilities (e.g., hospitals, medical centers, home health care services, and nursing homes), police/sheriff offices, and fire stations in the area would remain at risk. The potential for loss of life and injuries for any residents that remain in the area during storms, and the risks of post flood health hazards, are greater under the No Action Alternative as compared to the action alternatives. Residents are at an even greater risk for experiencing negative health outcomes when facilities that provide critical care or emergency services are impacted by flood events. The No Action Alternative has a higher potential for reducing the availability of health facilities and services and requiring additional fire and police protection than the project alternatives.

Alternative A
Medical care facilities, police/sheriff offices, and fire stations in the area would face lower hurricane/tropical storm surge damage risks. The potential for loss of life and injuries for any residents that remain in the area during storms, and the risks of post flood health hazards, remains. The Alternative would increase the availability of health facilities and services and fire and police protection after storms as compared to the No Action Alternative.

Alternative C
This alternative would reduce risk for the same number of facilities as Alternative A.

Alternative D
This alternative would reduce risk for all of the health and safety facilities in the study area.

Social Connectedness

No Action Alternative
The study area includes 4 libraries, 44 places of worship, and 25 schools. Under the No Action alternative all of these structures would remain at risk to hurricane/tropical storm surge damages. The risk would increase over time due to relative sea level rise.

Alternative A
This alternative would reduce risk for libraries, places of worship and schools within the levee system. Facilities outside of levees would remain vulnerable.

Alternative C
This alternative would reduce risk for the same number of libraries, places of worship and schools as Alternative A.

Alternative D

This alternative would reduce risk for all libraries, places of worship and schools in the area.

Leisure and Recreation

No Action Alternative
Under this alternative all area recreational sites and facilities would remain at risk to hurricane/tropical storm surge damages. The risk would increase over time due to relative sea level rise.

Alternative A
This alternative would reduce risk for sites within the levee system. Facilities outside of levees would remain vulnerable.

Alternative C
This alternative would reduce risk for the same number of recreation sites as Alternative A.

Alternative D
This alternative would reduce risk for all of the recreation sites in the study area.

Social Vulnerability and Resiliency

No Action Alternative
Social vulnerability in the area is expected to increase over time as the absolute number of socially vulnerable people (e.g., low-income, minority, less-educated, and over the age of 65) at risk for flood events increases with subsidence, sea level rise, and population growth. Under the No Action Alternative, the area would remain vulnerable to flooding, and long term resiliency would be hampered by the continued local efforts necessary to prepare for, and react to, flood events.

Alternative A
This alternative would reduce risk to socially vulnerable populations in St. Charles Parish, St. John the Baptist Parish, and parts of St. James Parish covered by the localized storm surge risk reduction measures. Over time the communities covered be the localized storm surge risk reduction measures will experience increasing storm surge flooding risks as relative sea level rise impacts the area.

Alternative C
This alternative would reduce risk to socially vulnerable populations to the same degree as Alternative A.

Alternative D
This alternative would reduce risk to socially vulnerable populations in St. Charles Parish, St. John the Baptist Parish, and St. James Parish.

Summary of Alternative Analysis
The study examined four alternatives: the No Action Alternative, Alternative A, Alternative C, and Alternative D. The OSE analysis evaluated the differential impact that each alternative is expected to have on the socioeconomic characteristics and other social factors of the study area. After first providing a description of the existing and future without-project socioeconomic characteristics and other social factors of the study area, an analysis of the impacts to population and housing,

medical/emergency facilities, civic infrastructure, and recreational areas under the three alternatives was conducted. The analysis was conducted based on without-project overflow and depth-of-flooding data for the years 2020 and 2070. Results show significant differences between the alternatives with important implications for the overall social well-being of the study area.

The No Action Alternative would not reduce the risk associated with hurricane and tropical storm damage to the study area. Therefore, there is a high potential for hurricane and tropical storm damage to continue in the area. The relative sea level rise that is taking place in the area, coupled with the anticipated population growth, is expected to magnify future flooding problems. As a result, subsequent flooding events could cause even more damage to housing units, public facilities, and commercial structures than has previously been experienced. Under this alternative, residents would remain at a higher risk for adverse health impacts such as loss of life and injury, as well as post flood health hazards. The area would remain vulnerable to flooding, and long term resiliency would be hampered by the continued local efforts necessary to prepare for, and react to, flood events.

Alternative A

The alternative would reduce the risk associated with hurricane and tropical storm surge damage to the study area. There is a lower potential for hurricane and tropical storm surge damages in the area with the levee alignment. Flooding events could still cause damage to housing units, public facilities, and commercial structures. Under this alternative, residents would remain at risk for adverse health impacts such as loss of life and injury, as well as post flood health hazards. As with all other alternatives, residents should heed public safety warnings and evacuate to avoid storm hazards, However, the area would be less vulnerable to flooding, and long term resiliency would be enhanced with a levee in place.

Alternative C

This alternative would reduce risk in the study area to the same degree as Alternative A.

Alternative D

This alternative would result in the greatest potential for reduced flooding in the study area. It would reduce the risks associated with damages to housing units, public facilities, and commercial structures and provide increased protection to the health and safety of residents. The area's social vulnerability would be reduced under this alternative, and thus, the potential for long-term growth and sustainability would be enhanced. Also, under this alternative, the area would be at a reduced risk of incurring the costs associated with clean-up, debris removal, and building and infrastructure repair as a result of flood events.

References

U.S. Army Corps of Engineers. 2009. Handbook on Applying "Other Social Effects" Factors in Corps of Engineers Water Resources Planning. IWR Publication 09-R-4. December 2009. 198 pages. See http://www.iwr.usace.army.mil/Portals/70/docs/iwrreports/09-R-4.pdf

U.S. Bureau of the Census, 2010. U.S. Census of Population and Housing, SF1 and SF3 data tables. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml. Accessed January 10, 2012.

U.S. Bureau of the Census, 2006-2010 American Community Survey. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml. Accessed February 10, 2012.

U.S. Bureau of the Census. State and County Quickfacts. St. Charles Parish, Louisiana. http://quickfacts.census.gov/qfd/states/22/22089.html. Accessed May 17, 2014.

U.S. Bureau of the Census. 2014. State and County Quickfacts. St. James Parish, Louisiana. http://quickfacts.census.gov/qfd/states/22/22093.html. Accessed May 17, 2014.

U.S. Bureau of the Census. State and County Quickfacts. St. John the Batist Parish, Louisiana. http://quickfacts.census.gov/qfd/states/22/22095.html. Accessed May 17, 2014.

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

PLAN FORMULATION
APPENDIX E

Contents

Introduction 3
Management Measures 4
Initial Array of Alternative Plans 7
Further Development of the Localized Storm Surge Risk Reduction Component 21
Engineering Details of the Localized Storm Surge Risk Reduction Features 26

INTRODUCTION

This appendix provides supplemental plan formulation information on the West Shore Lake Pontchartrain, Louisiana Hurricane and Storm Damage Risk Reduction Feasibility study. It supplements the information in Chapter 3 of the main report and includes tables and maps used in the development, screening, and evaluation of management measures and alternative plans.

Per the study authority, as identified in Chapter 1, the study area includes portions of St. Charles, St. John the Baptist, and St. James Parishes. It is bounded on the east by the Bonnet Carré Spillway upper guide levee, on the north by Lakes Pontchartrain and Maurepas, on the west by the Ascension/St. James Parish line, and on the south by the Mississippi River Levee (**Figure 1**).

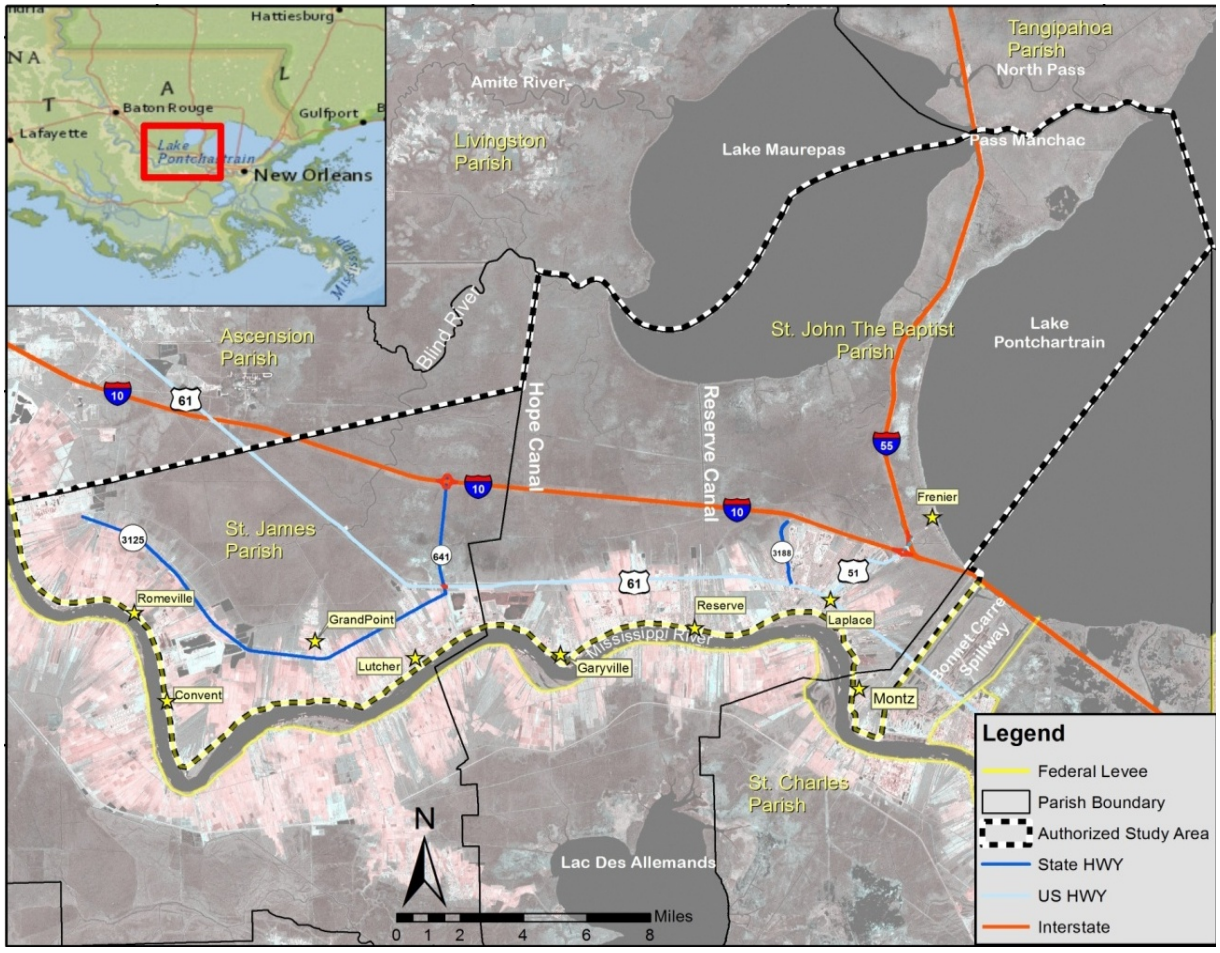


Figure 1: Study Area

The study goals, objectives and constraints are identified in Chapters 1 and 3 of the draft report. They are included as a point of reference for understanding details of the screening process (**Table 1**).

Table 1: Objectives and Constraints

OBJECTIVES	CONSTRAINTS
1. Reduce hurricane storm surge related damages through 2070.	1. Minimize impacts to wetlands.
2. Reduce risk to residents' life and health by decreasing flooding to the maximum extent practical.	2. Minimize impacts to the Small Diversion at Convent/Blind River project and River Reintroduction into Maurepas Swamp Project.
3. Increase public awareness of hurricane risks in developed flood prone areas.	3. No loss of flood protection from existing flood damage risk reduction projects.
4. Enhance public awareness of the risk to life and property of development in flood prone areas.	4. Minimize impacts to the Maurepas Swamp Wildlife Management Area and surrounding wetlands.
5. Reduce the risk of damage and loss of critical infrastructure, specifically the I-10/I-55 hurricane evacuation routes.	5. Minimize infrastructure impacts (pipelines, highways, hospitals, schools, fire stations, and police stations).

MANAGEMENT MEASURES

Measures considered for this study are outlined in **Chapter 3, Section 3.3**. This section provides additional information about those measures that were evaluated and removed from further consideration during the planning process. As discussed in Chapter 3, these measures were screened and evaluated based on their ability to meet the planning objectives while avoiding the study constraints (see **Table 1**). Additional criteria of effectiveness and efficiency were used.

Cypress Reforestation: This measure would enhance and/or restore cypress forest on the Maurepas Landbridge and in the Maurepas Swamp to reduce surge heights. The measure did not meet objectives to reduce the risk of damages to structures and to residents' life and health. Structures would still be damaged from the increased still water levels during storms. Consequently, the measure was screened because it was ineffective. **Figure 2** demonstrates the storm surge flow through cypress vegetation.

Seawall: This measure would construct a seawall along the rim of Lakes Maurepas and Pontchartrain. This measure would have adverse impacts to the existing environmental systems and drainage system. This measure would enclose the Maurepas Swamp and would stop water exchanges between Lake Maurepas and the swamp (see **Figure 3**). The mitigation features for this measure would be cost prohibitive. The measure was screened because it was not cost effective.

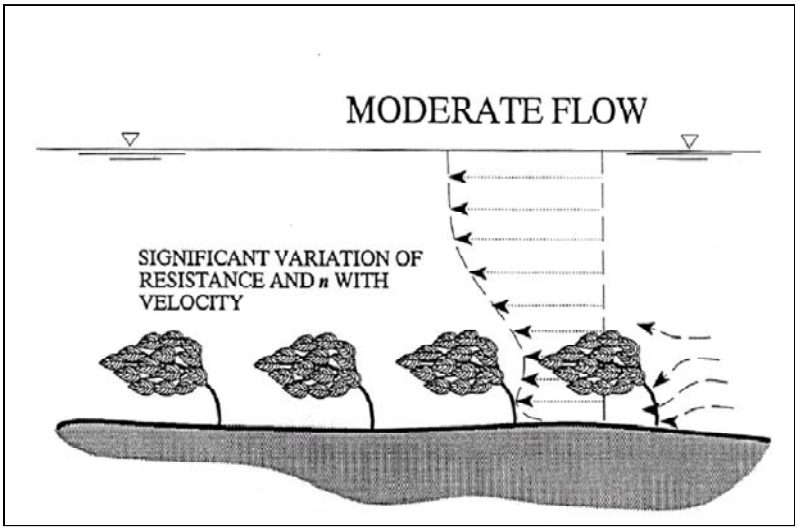


Figure 2: Storm Surge through Vegetation

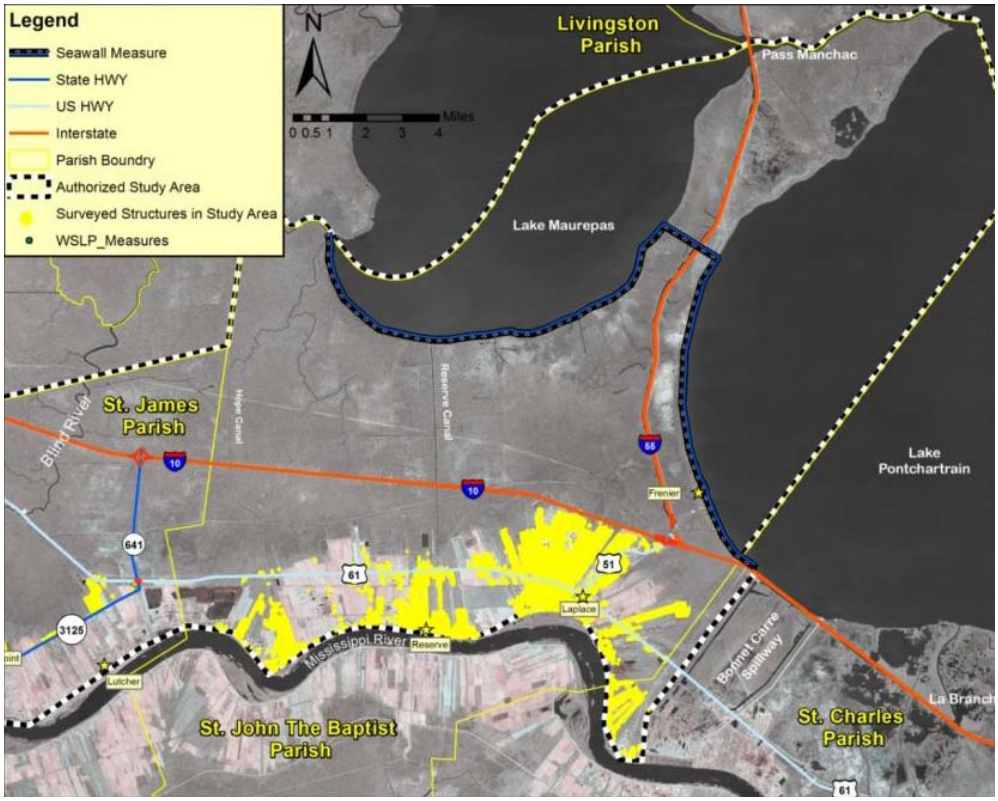


Figure 3: Seawall Measure

Flood Forecast and Warning: The area has an ample Forecast/Warning System. NOAA, FEMA, and the USACE already take the responsibility for producing the storm surge maps under existing floodplain management authorization.

Floodgates on Tidal Passes: This measure would place a large tide control structure on Pass Manchac, and potentially North Pass, to prevent storm surge from entering the area. It would have adverse impacts to the

environment and drainage system. A control structure would restrict tidal flows under normal conditions and limit the upper basin's ability to drain during storms. The mitigation features would be cost prohibitive (inefficient). Additionally, it would be ineffective due to surge flanking.

Highway/Levee: This measure would raise the I-10 roadbed to serve as a levee to reduce risk of surge damage. Using the roadbed as a levee system would require massive changes to the existing highway system. In addition, future levee lifts would require the highway to be replaced at each event.

Control Structures (Canals and Bayous): Control structures were evaluated as both a stand-alone measure and in combination with other measures. It was removed as a standalone measure because at higher storm surge events, surge heights are higher than the existing banks, making a canal closure alone ineffective (see **Figure 4 and 5**). However portions of the feature were carried forward in combination with other measures.

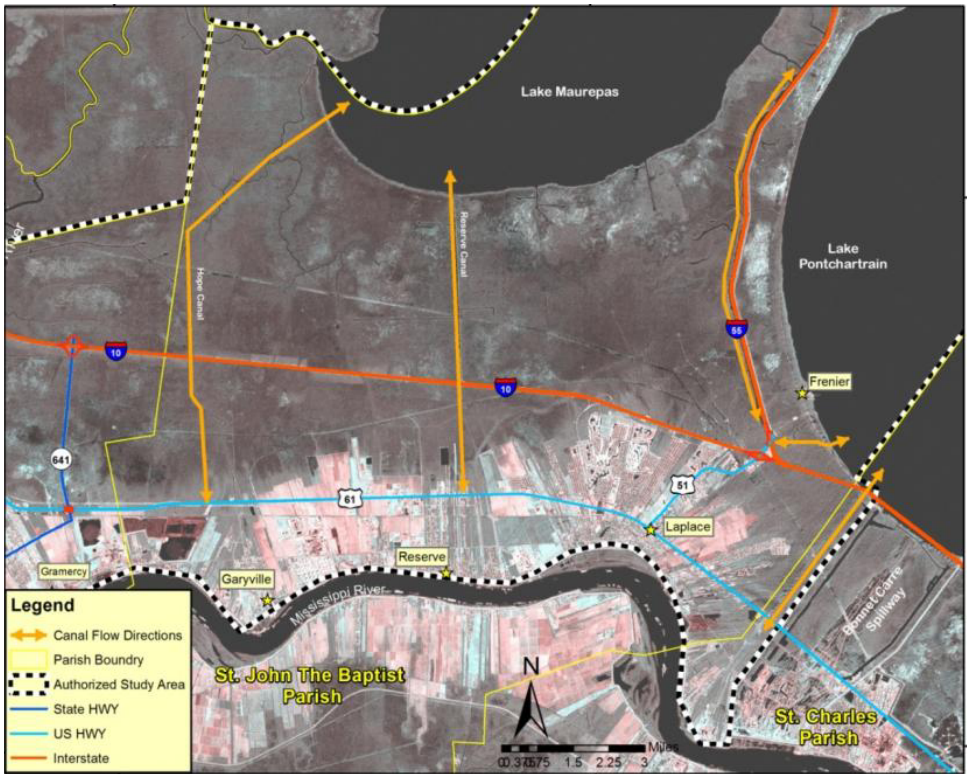


Figure 4: Canal Drainage Patterns

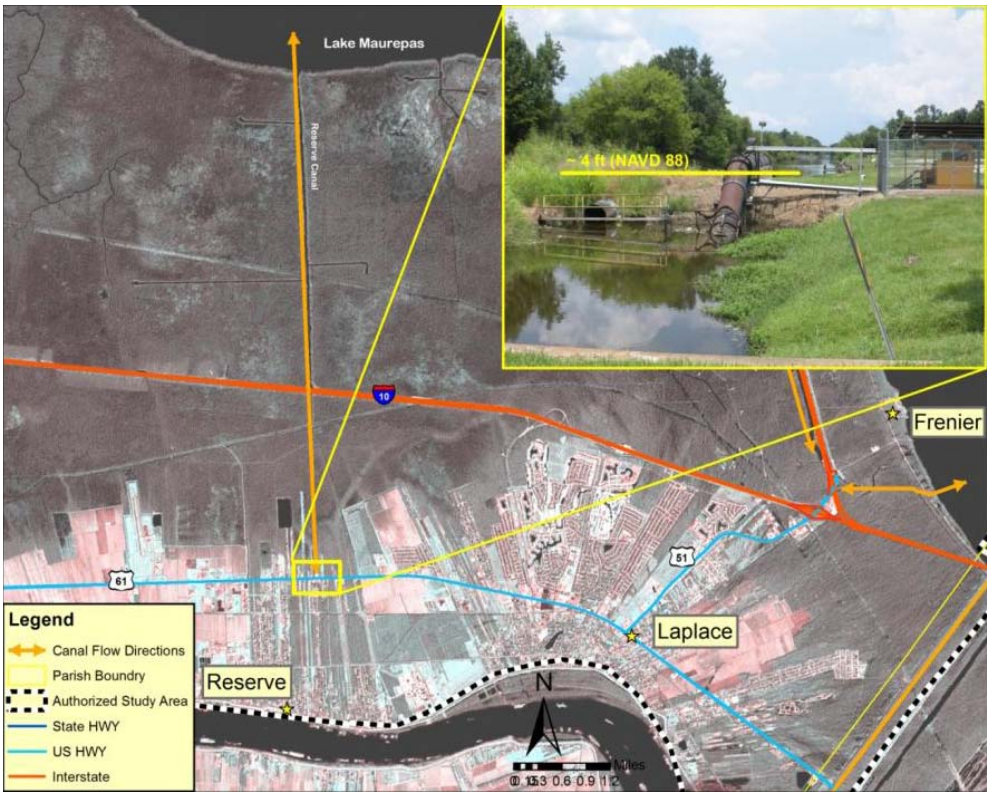


Figure 5: Reserve Canal Cross Section View

INITIAL ARRAY OF ALTERNATIVE PLANS

As discussed in **section 3.4** of the Final Report, structural plans developed from earlier study efforts were incorporated into the plan formulation process as documented in this report. Structural alternative plans typically included an earthen levee with control structures which extend from the west guide levee of the Bonnet Carré Spillway in St. Charles Parish to various points west in the area. **Table 2** outlines the structural plans considered in this study and **Figures 6 through 17** maps the alignments.

Table 2: Initial Array of Structural Plans

Condensed Plan ID	Linkages to Past WSLP efforts
Plan 1: Spillway to Reserve Canal	1987 Reconnaissance Report: Alignment #2 1997 Reconnaissance Report: Alignment 2 1998 Scoping Report: Alignment #2
Plan 2: Spillway to East St. John High School (ESJHS)	1985 Initial Evaluation Report: Alignment #2 1997 Reconnaissance Report: Alignment 1 1998 Scoping Report: Alignment # 1
Plan 3: Spillway to ESJHS (wetland/non-wetland)	1997 Reconnaissance Report: Alignment # 5 1998 Scoping Report: Alignment # 3
Plan 4: Spillway to ESJHS (I-10 Offset)	1997 Reconnaissance Report: Alignment # 5 1998 Scoping Report: Alignment # 1

Plan 5: Spillway to Marathon	1997 Reconnaissance Report: Alignment 2 1998 Scoping Report: Alignment #2 2006 Evaluation of Draft FS Report : USACE Plan A 2007 Screening Assessment: Alignment A
Plan 6: Spillway to Reserve (US-51 Protection)	1985 Initial Evaluation Report: Alignment #4 1997 Reconnaissance Report: Alignment 1A/B 1998 Scoping Report: Alignment # 1
Plan 7: Spillway to Marathon (wetland/non-wetland)	1997 Reconnaissance Report: Alignment 1A/B 1998 Scoping Report: Alignment # 1 2006 Evaluation of Draft FS Report : USACE Plan A 2007 Screening Assessment: Alignment A
Plan 8: Spillway to Ascension Parish/MS River	1985 Initial Evaluation Report: Alignment #3 1997 Reconnaissance Report: Alignment 2A/B 2007 Screening Assessment: Alignment D
Plan 9: Spillway to Hope Canal/MS River	1997 Reconnaissance Report: Alignment # 5 2006 Evaluation of Draft FS Report : USACE Plan A 2007 Screening Assessment: Alignment A
Plan 10: Spillway to Hope Canal/MS River (I-10 Protection)	1985 Initial Evaluation Report: Alignment #3 2006 Evaluation of Draft FS Report : St. John Plan B 2007 Screening Assessment: Alignment B
Plan 11: Spillway to Hope Canal/MS River (Pipeline Avoidance)	1985 Initial Evaluation Report: Alignment #1 1987 Reconnaissance Report: Alignment #1 2006 Evaluation of Draft FS Report : St. John Revised 2007 Screening Assessment: Alignment C
Plan 12: Spillway to Ascension Parish (I-10 Protection)	1985 Initial Evaluation Report: Alignment #3 2007 Screening Assessment: Alignment D

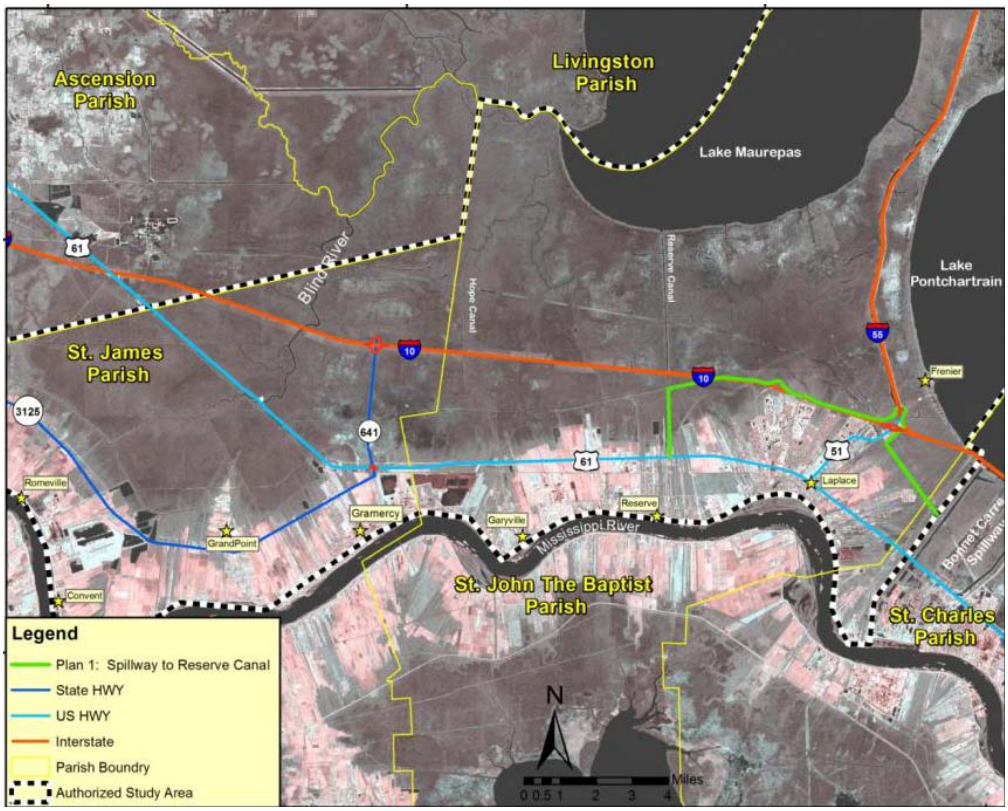


Figure 6: Plan 1 - Bonne Carré Spillway to Reserve Canal

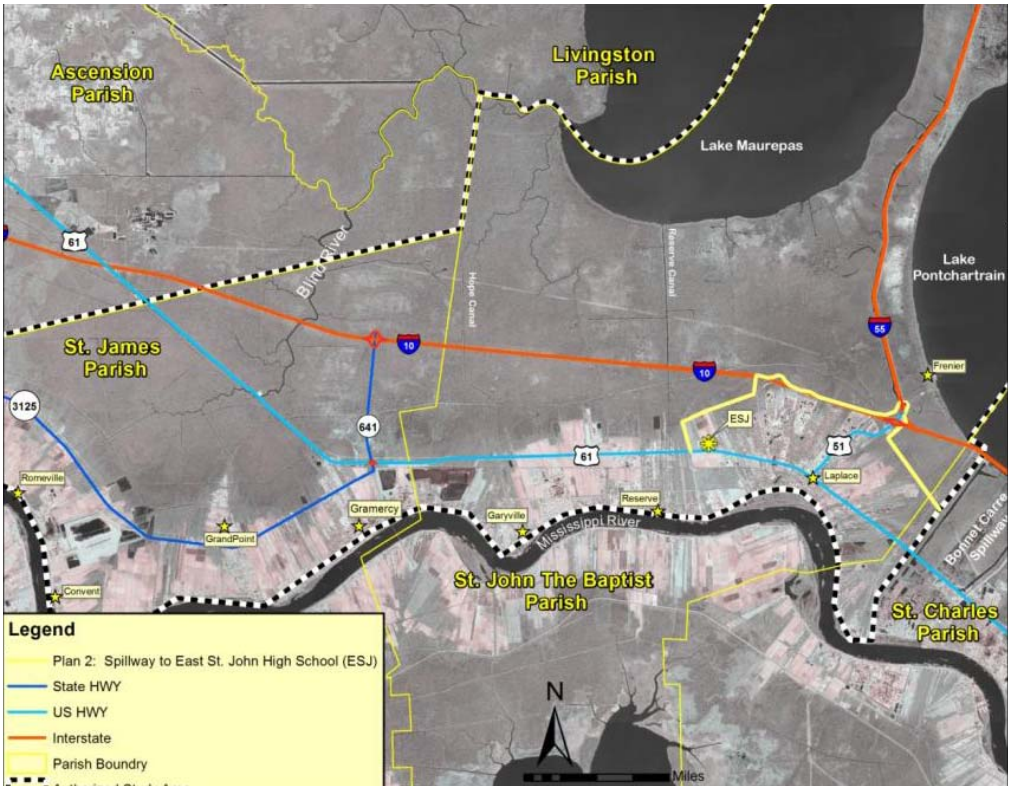


Figure 7: Plan 2 - Bonnet Carré Spillway to ESJHS

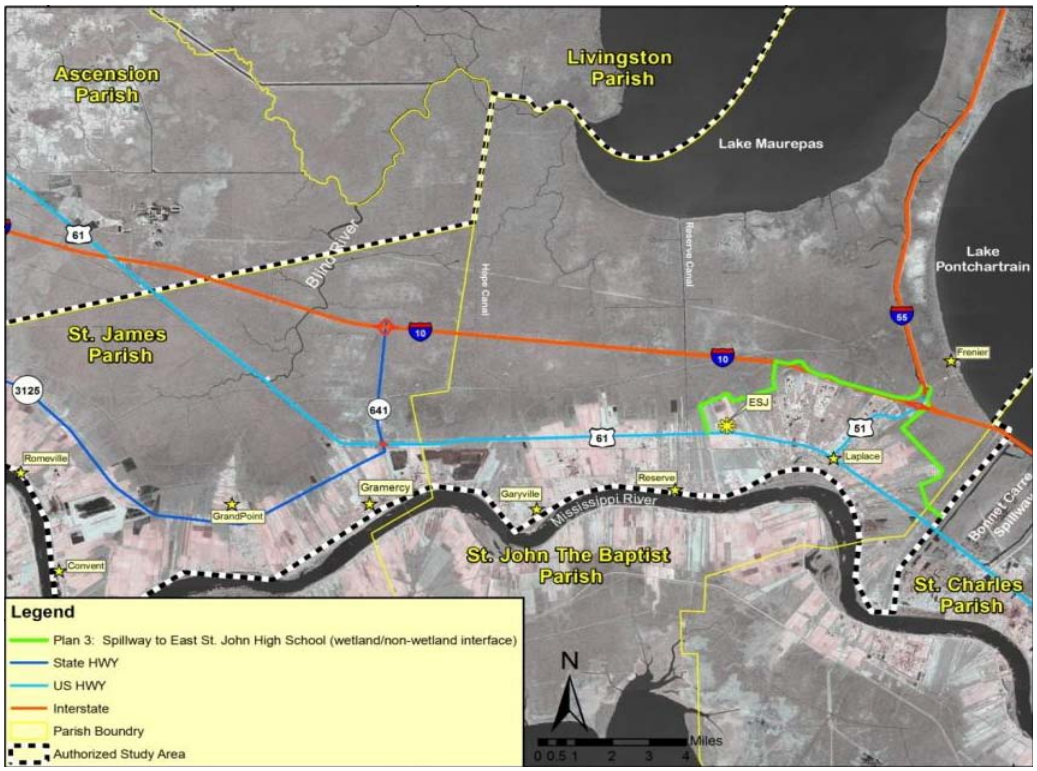


Figure 8: Plan 3 - Bonnet Carré Spillway to ESJHS (wetland interface)

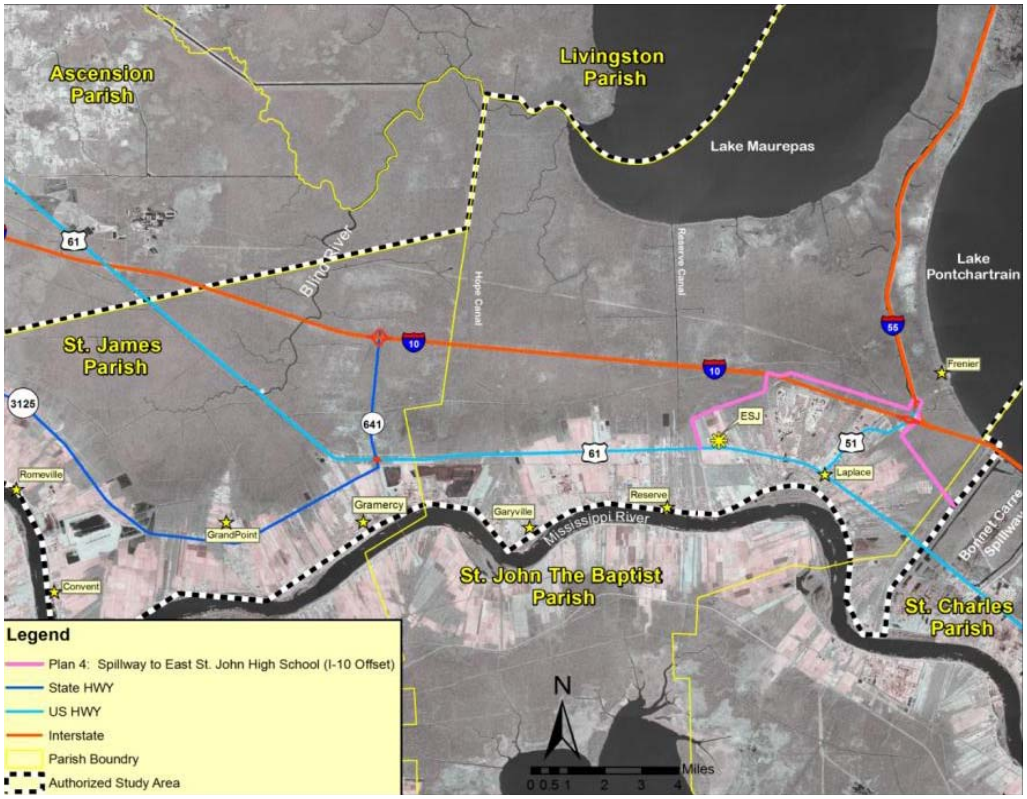


Figure 9: Plan 4 - Bonnet Carré Spillway to ESJHS (I-10 Offset)

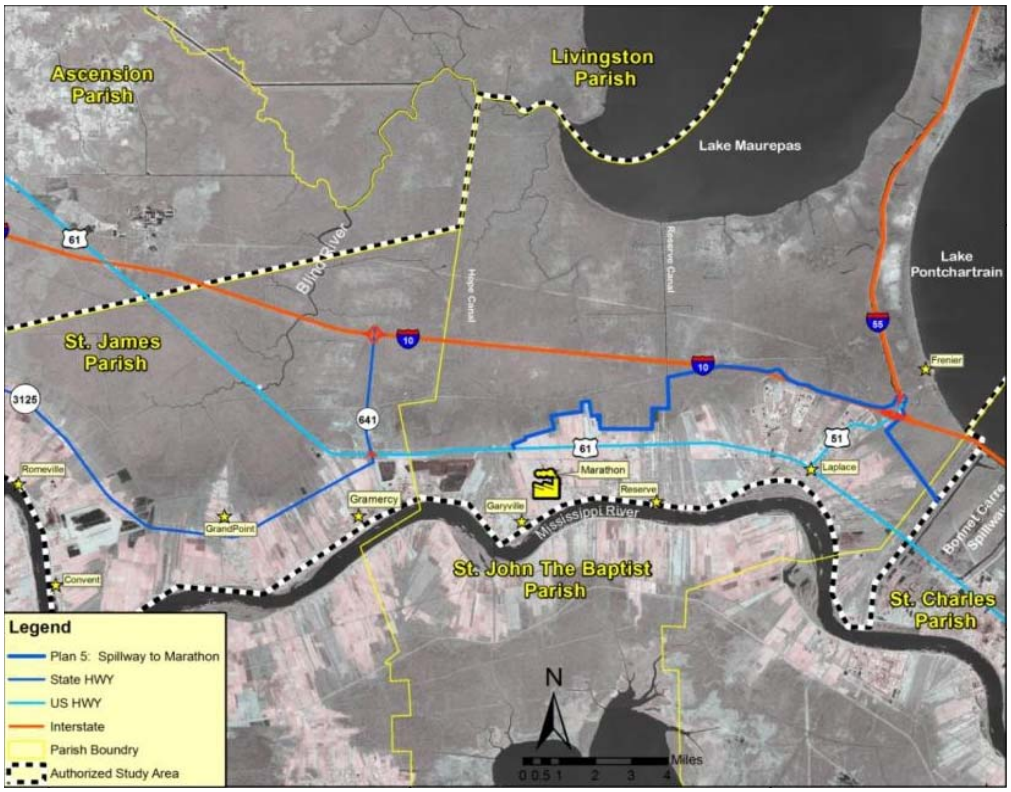


Figure 10: Plan 5 - Bonnet Carré Spillway to Spillway to Marathon

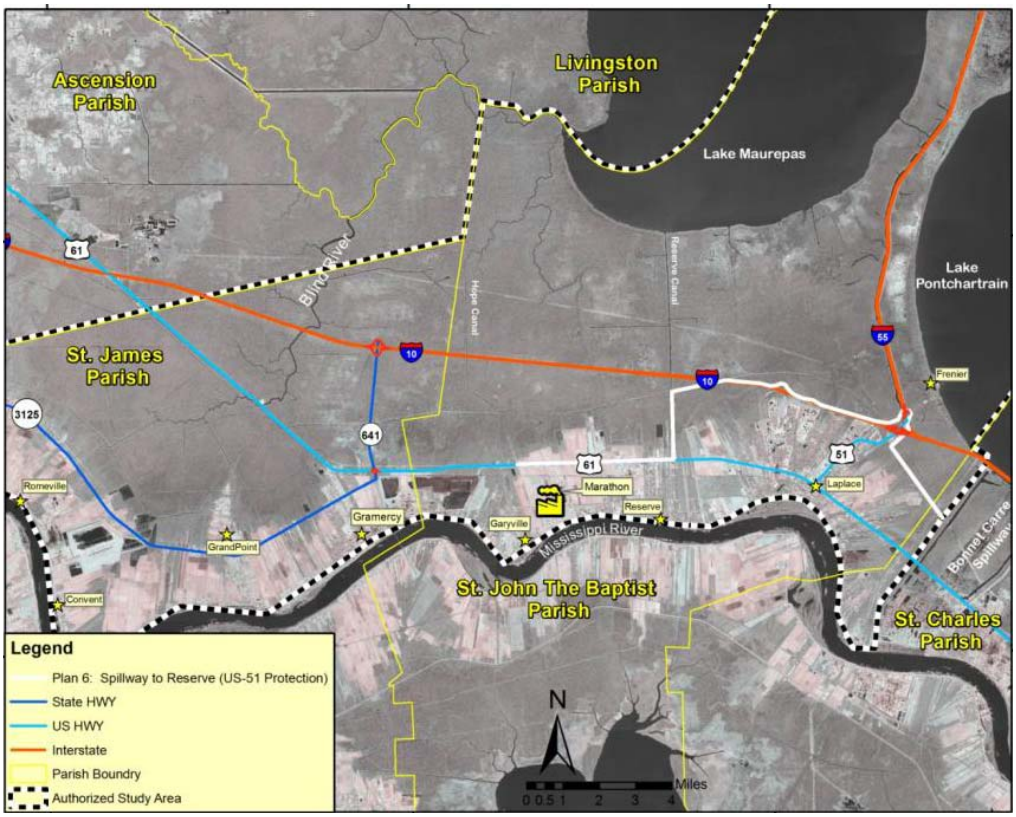


Figure 11: Plan 6 - Bonnet Carré Spillway to Reserve (US-51 Risk Reduction)

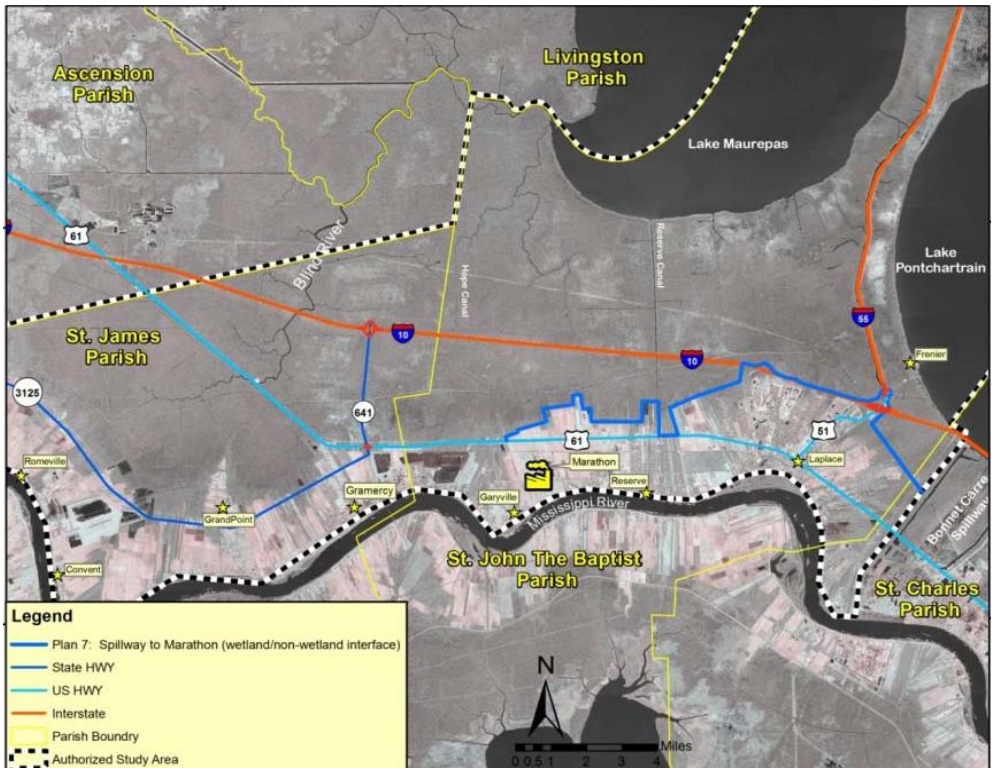


Figure 12: Plan 7 - Bonnet Carré Spillway to Marathon (wetland interface)

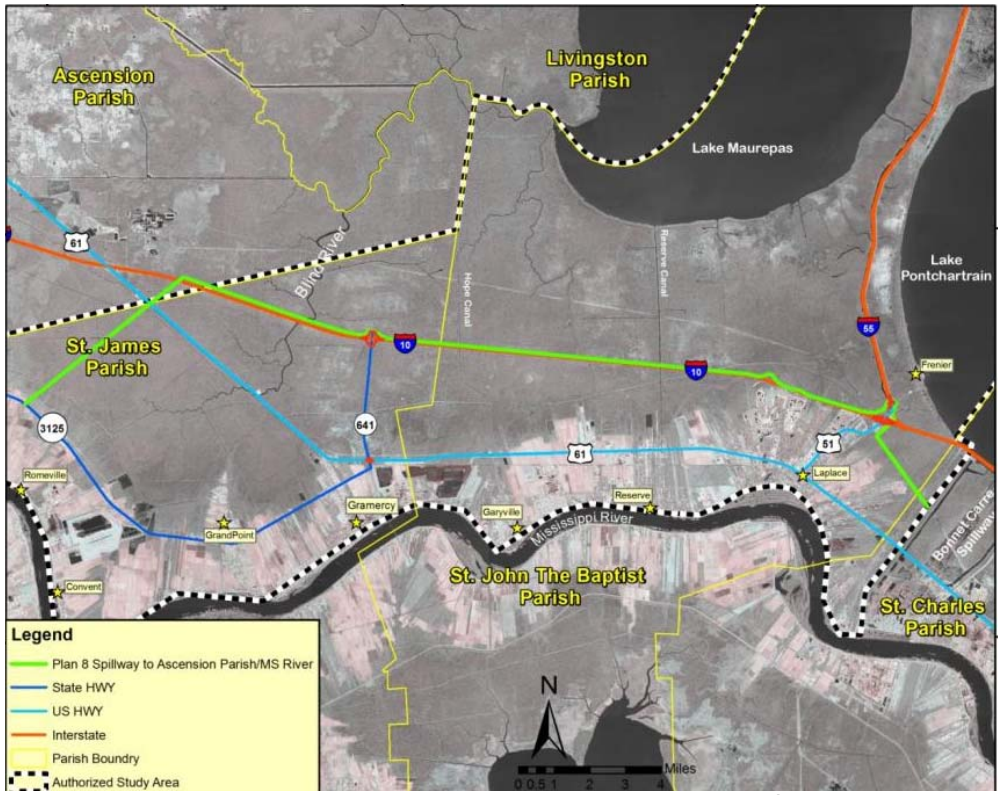


Figure 13: Plan 8 - Bonnet Carré Spillway to Ascension Parish/Mississippi River

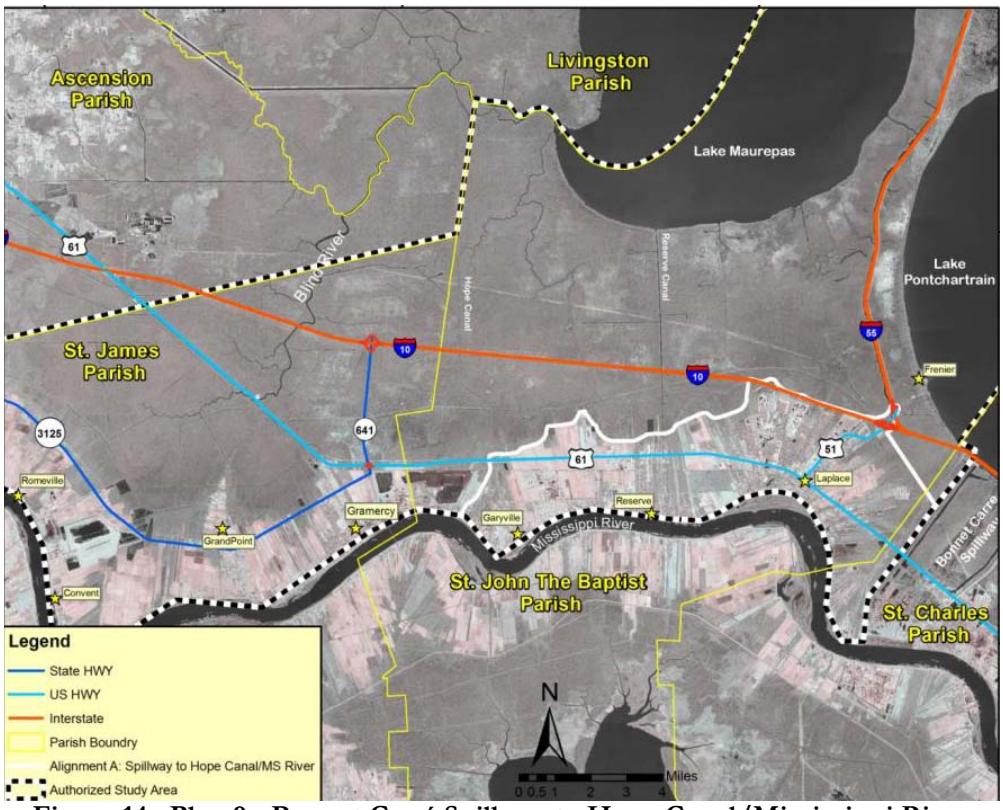


Figure 14: Plan 9 - Bonnet Carré Spillway to Hope Canal/Mississippi River

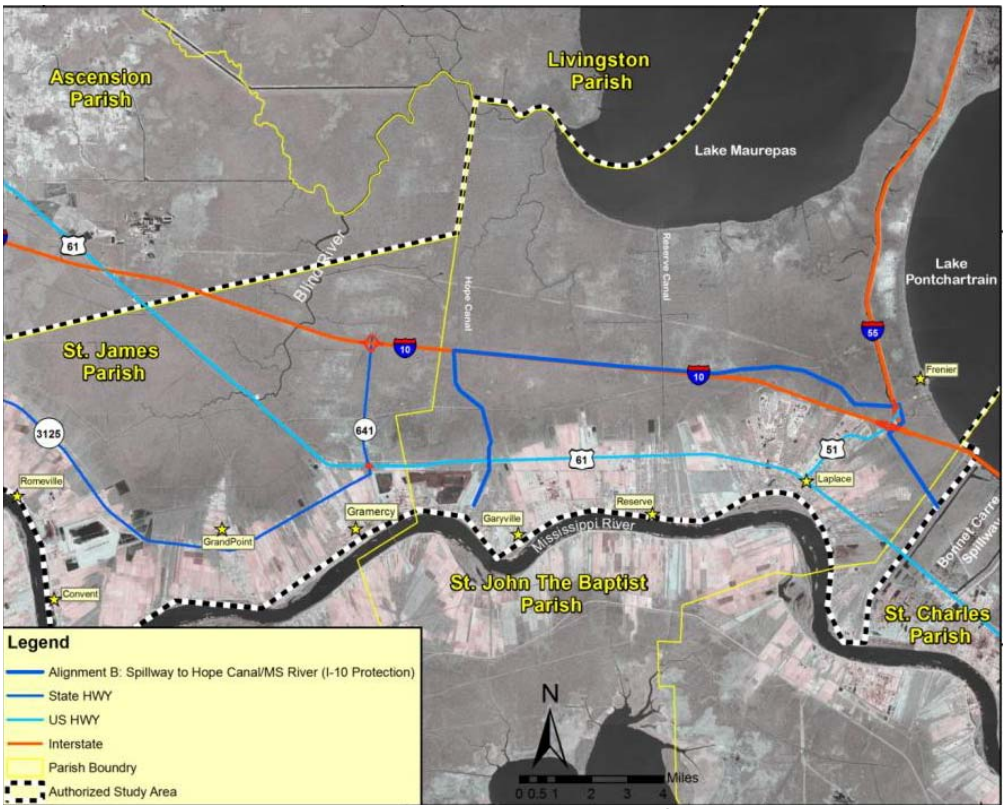


Figure 15: Plan 10 - Bonnet Carré Spillway to Hope Canal/MS River (I-10 Risk Reduction)

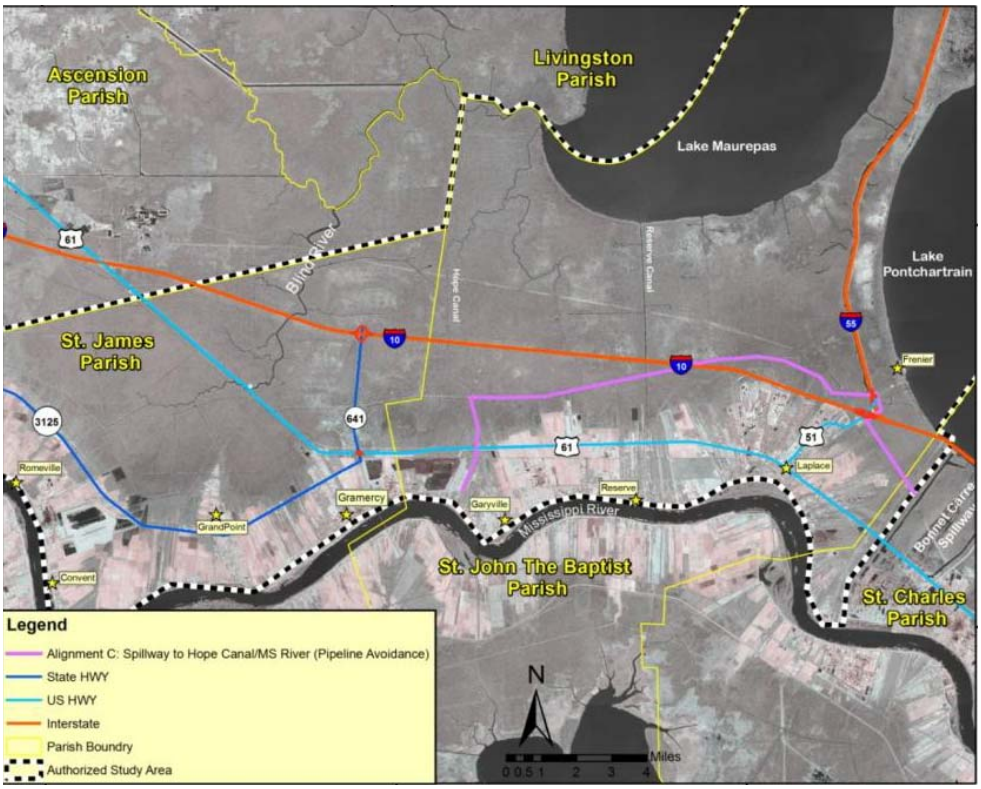


Figure 16: Plan 11 - Bonne Carré Spillway to Hope Canal/MS River (Pipeline Avoidance)

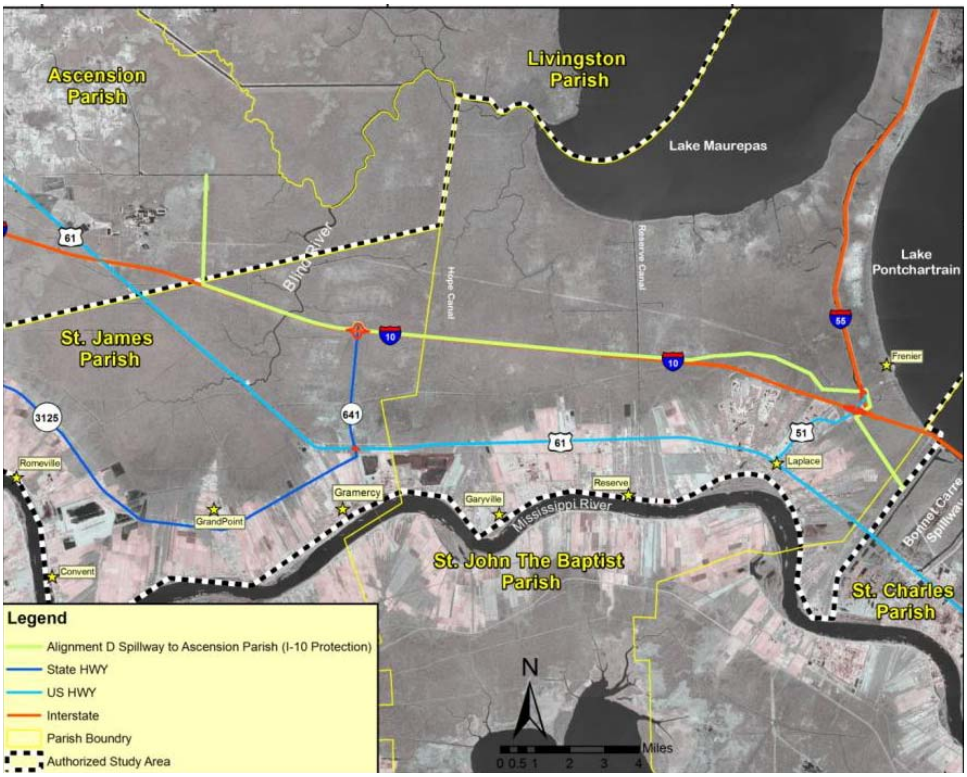


Figure 17: Plan 12 - Bonnet Carré Spillway to Ascension Parish (I-10 Risk Reduction)

To determine the plans to evaluate further, each plan was scored from 5 (high performing) to 1 (low performing) based on how well it met objectives and avoided constraints. Objectives 3 and 4 were not used in the screening of the initial array; do to the fact that all plans would meet Objectives 3 and 4 equally. The scores were totaled and the plans were compared, evaluated and screened. Scores for meeting the objectives and avoiding constraints were developed by reviewing existing available data sources and newly modeled storm surge impacts **(Table 3)**.

Table 3: Screening and Ranking of Initial Array Plans against Objectives and Constraints

	Objectives Ranked (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)			Avoids Constraint (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)					
Condensed Plan ID	#1 Storm damages	#2 Reduce risk to life and health	#5 Reduce the risk of damage and loss of critical infrastructure	#1 Min. impacts to wetlands	#2 Min. impacts to diversion projects	#3 No loss of existing flood protection	#4 Avoid impacts to WMA & wetlands	#5 Min. impacts to critical infrastructure	SUM
Plan 11: Spillway to Hope Canal/MS River (Pipeline Avoidance)	4 Received a 4 due to the fact that under the existing conditions there were significant flooding of structures until you reached Hope Canal. 95% of the FWOP equivalent annual damages would be addressed by this plan.	4 Received a 4 due to the fact that under the existing conditions the plan would prevent surges from flooding of areas which saw depths of flooding greater than 2.5 ft deep. It was assumed that areas that received a greater than 2.5 feet of flooding above the ground would create a hazard to life. Also, the team reviewed the potential for plans to increase water depths outside of the system. Due to the tie in points of the plan there would be limited impacts to structures outside of the plan.	4 Received a 4 due to the fact that under the existing conditions the plan would prevent surges from flooding I-10 and US-61. The Plan did not receive a 5 because these highways would flood in the future west of the plan.	3 Received a 3 due to the fact that it minimized the indirect impacts to the wetlands where possible. The plan did not score higher because there is still ~16 sq miles of wetlands behind the alignment.	3 Received a 3 due to the fact that it would parallel the Hope Canal Diversion and would not interfere with the proposed lateral discharges. The plan did not receive a 4 because the plan would still have to coordinate the design of a drainage structure at Hope Canal.	3 Received a 3 due to the fact that the plan did not risk disruptions to the local drainage patterns northward.	3 Received a 3 due to the fact that it minimized the indirect impacts to the WMA where possible.	5 Received a 5 due to the fact that it avoided a large # of pipelines.	29

	Objectives Ranked (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)			Avoids Constraint (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)					
Condensed Plan ID	#1 Storm damages	#2 Reduce risk to life and health	#5 Reduce the risk of damage and loss of critical infrastructure	#1 Min. impacts to wetlands	#2 Min. impacts to diversion projects	#3 No loss of existing flood protection	#4 Avoid impacts to WMA & wetlands	#5 Min. impacts to critical infrastructure	SUM
Plan 9: Spillway to Hope Canal/MS River	4 Received a 4 due to the fact that under the existing conditions there were significant flooding of structures until you reached Hope Canal. 95% of the FWOP equivalent annual damages would be addressed by this plan.	4 Received a 4 due to the fact that under the existing conditions the plan would prevent surges from flooding of areas which saw depths of flooding greater than 2.5 ft deep. It was assumed that areas that received a greater than 2.5 feet of flooding above the ground would create a hazard to life. In addition, the team reviewed the potential for plans to increase water depths outside of the system. Due to the tie in points of the plan there would be limited impacts to structures outside of the plan.	4 Received a 4 due to the fact that under the existing conditions the plan would prevent surges from flooding I-10 and US-61. The Plan did not receive a 5 because these highways would flood in the future west of the plan.	5 Received a 5 due to the fact that it minimized the direct and indirect impacts to the wetlands by following the wet/dry interface.	4 Received a 4 due to the fact that it would parallel the Hope Canal Diversion and would not interfere with the proposed lateral discharges.	1 Received a 1 because the plan would disrupt the local drainage patterns northward. A pump station would have to be placed on each drainage ditch to remove rainwaters during a storm surge event.	5 Received a 5 due to the fact that it avoided all indirect and direct impacts to the WMA.	1 Received a 1 because it did not avoid a large # of pipelines. There are over 70 pipeline crossings. Many of these pipelines are small feeder pipelines that join up with a mainline pipeline south of Plan 11.	28
Plan 10: Spillway to Hope Canal/MS River (I-10 Protection)	4 Received a 4 due to the fact that under the existing conditions there were significant flooding of structures until you reached Hope Canal. 95% of the FWOP equivalent annual damages would be addressed by this plan.	4 Received a 4 due to the fact that under the existing conditions the plan would prevent surges from flooding of areas which saw depths of flooding greater than 2.5 ft deep. It was assumed that areas that received a greater than 2.5 feet of flooding above the ground would create a hazard to life. Also the team reviewed the potential for plans to increase water depths outside of the system. Due to the tie in points of the plan there would be limited impacts to structures outside of the plan.	4 Received a 4 due to the fact that under the existing conditions the plan would prevent surges from flooding I-10 and US-61. The Plan did not receive a 5 because these highways would flood in the future west of the plan.	2 Received a 2 due to the fact that it minimized the indirect impacts to the wetlands where possible, but Plan 10 would reduce risk to the same number of structures as Plan11 and would enclose approximately 4,000 more acres of wetlands.	3 Received a 3 due to the fact that it would parallel the Hope Canal Diversion and would not interfere with the proposed lateral discharges. The plan did not receive a 4 because the plan would still have to coordinate the design of a drainage structure at Hope Canal.	3 Received a 3 due to the fact that the plan did not risk disruptions to the local drainage patterns northward.	2 Received a 2 due to the fact that it minimized the indirect impacts and direct impacts to the WMA where possible.	5 Received a 5 due to the fact that it avoided a large # of pipelines	27

	Objectives Ranked (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)			Avoids Constraint (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)					
Condensed Plan ID	#1 Storm damages	#2 Reduce risk to life and health	#5 Reduce the risk of damage and loss of critical infrastructure	#1 Min. impacts to wetlands	#2 Min. impacts to diversion projects	#3 No loss of existing flood protection	#4 Avoid impacts to WMA & wetlands	#5 Min. impacts to critical infrastructure	SUM
Plan 12: Spillway to Ascension Parish (I-10 Protection)	5 Received a 5 due to the fact it addressed all flooding under the existing conditions and future conditions. 100% of the of the FWOP equivalent annual damages would be addressed by this plan.	4 Received a 4 due to the fact that under the existing conditions the plan would prevent surges from flooding of areas which saw depths of flooding greater than 2.5 ft deep. It was assumed that areas that received a greater than 2.5 feet of flooding above the ground would create a hazard to life. Also the team reviewed the potential for plans to increase water depths outside of the system. Due to the tie in points of the plan there would be limited impacts to structures outside of the plan.	5 Received a 5 due to the fact that under the existing and future conditions the plan would prevent surges from flooding I-10 and US-61.	1 Received a 1 due to the fact that it would enclose ~79 sq miles of wetlands.	1 Received a 1 due to the fact that it would cross the Hope Canal Diversion and would enclose the Convent Blind River Diversion.	4 Received a 4 due to the fact that the plan did not risk disruptions to the local drainage patterns northward. The plan received a higher # than 3 due to the fact there is a large drainage basin to capture and hold rainfall during a storm event.	1 Received a 1 due to the fact that it directly impacted to the WMA across large areas.	4 Received a 4 due to the fact that it avoided a large # of pipelines. The plan did not receive a 5 because the plan would have to avoid additional impacts on the far western end of the plan.	25
Plan 8: Spillway to Ascension Parish/MS River	5 Received a 5 due to the fact it addressed all flooding under the existing conditions and future conditions. 100% of the of the FWOP equivalent annual damages (EAD) would be addressed by this plan.	4 Received a 4 due to the fact that under the existing conditions the plan would prevent surges from flooding of areas which saw depths of flooding greater than 2.5 ft deep. It was assumed that areas that received a greater than 2.5 feet of flooding above the ground would create a hazard to life. Also the team reviewed the potential for plans to increase water depths outside of the system. Due to the tie in points of the plan there would be limited impacts to structures outside of the plan.	5 Received a 5 due to the fact that under the existing and future conditions the plan would prevent surges from flooding I-10 and US-61.	1 Received a 1 due to the fact that it would enclose ~79 sq miles of wetlands.	1 Received a 1 due to the fact that it would cross the Hope Canal Diversion and would enclose the Convent Blind River Diversion.	4 Received a 4 due to the fact that the plan did not risk disruptions to the local drainage patterns northward. The plan received a higher # than 3 due to the fact there is a large drainage basin to capture and hold rainfall during a storm event.	1 Received a 1 due to the fact that it directly impacted to the WMA across large areas.	4 Received a 4 due to the fact that it avoided a large # of pipelines. The plan did not receive a 5 because the plan would have to avoid additional impacts on the far western end of the plan.	25

	Objectives Ranked (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)			Avoids Constraint (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)					
Condensed Plan ID	#1 Storm damages	#2 Reduce risk to life and health	#5 Reduce the risk of damage and loss of critical infrastructure	#1 Min. impacts to wetlands	#2 Min. impacts to diversion projects	#3 No loss of existing flood protection	#4 Avoid impacts to WMA & wetlands	#5 Min. impacts to critical infrastructure	SUM
Plan 3: Spillway to ESJ (wetland/non-wetland)	2 Received a 2 due to the fact that it only addressed a limited portion of the FWOP equivalent annual damages. Damages EAD . Two of the highest EAD reaches, SA-27 and SA-21 would have left be left outside of the plan.	1 Received a 1 due to the fact that the plan's tie-in point would be directly through a developed area. There would be a high risk that stages outside of the plan could be higher with the plan in place.	3 Received a 3 due to the fact that under the existing conditions the plan would prevent surges from flooding I-10 and parts of US-61. The plan did not receive a 4 because US-61 could still flood under the existing conditions west of ESJ.	5 Received a 5 due to the fact that it minimized the direct and indirect impacts to the wetlands by following the wet/dry interface.	4 Received a 4 due to the fact that it would stop before the Hope Canal Diversion and would not interfere with the proposed lateral discharges.	1 Received a 1 because the plan would disrupt the local drainage patterns northward. There would be limited storage for rainfalls events. Very efficient pump stations would have to be placed on each drainage ditch to remove rainwaters during a storm surge event.	5 Received a 5 due to the fact that it avoided all indirect and direct impacts to the WMA.	2 Received a 2 because it did not avoided a large # of pipelines.. Many of these pipelines are small feeder pipelines that join up with a mainline pipeline south of Plan 11.	23
Plan 2: Spillway to East St. John High School (ESJ)	2 Received a 2 due to the fact that it only addressed a limited portion of the FWOP equivalent annual damages. Damages EAD . Two of the highest EAD reaches, SA-27 and SA-21 would have left be left outside of the plan.	1 Received a 1 due to the fact that the plan's tie-in point would be directly through a developed area. There would be a high risk that stages outside of the plan could be higher with the plan in place.	3 Received a 3 due to the fact that under the existing conditions the plan would prevent surges from flooding I-10 and parts of US-61. The plan did not receive a 4 because US-61 could still flood under the existing conditions west of ESJ.	4 Received a 4 due to the fact that it in most areas minimized the direct and indirect impacts to the wetlands by following the wet/dry interface. It did not receave a 5 because it still enclosed wetlands between the Belle Terre Exit and ESJ.	4 Received a 4 due to the fact that it would stop before the Hope Canal Diversion and would not interfere with the proposed lateral discharges.	2 Received a 2 because the plan would disrupt the local drainage patterns northward. In most areas, a pump station would have to be placed on each drainage ditch to remove rainwaters during a storm surge event.	4 Received a 4 due to the fact that it minimized the indirect impacts to the WMA where possible.	2 Received a 2 because it did not avoided a large # of pipelines.. Many of these pipelines are small feeder pipelines that join up with a mainline pipeline south of Plan 11.	22
Plan 7: Spillway to Marathon (wetland/non-wetland)	2 Received a 2 due to the fact that it left the community of Garyville, structures in Reserve and a portion Marathon refinery outside of the plan. Both these areas would see significant flooding under the existing conditions.	2 Received a 2, because the plan did reduce flooding depths to a larger area, but the plan still could increase stages in the community of Garyville.	3 Received a 3 due to the fact that under the existing conditions the plan would prevent surges from flooding I-10 and parts of US-61. The plan did not receive a 4 because US-61 could still flood under the existing conditions west of Marathon.	4 Received a 4 due to the fact that it in most areas minimized the direct and indirect impacts to the wetlands by following the wet/dry interface. It did not receave a 5 because it still enclosed wetlands between the Belle Terre Exit and ESJ.	4 Received a 4 due to the fact that it would stop before the Hope Canal Diversion and would not interfere with the proposed lateral discharges.	1 Received a 1 because the plan would disrupt the local drainage patterns northward. There would be limited storage for rainfalls events, especially in the area of Reserve. Very efficient pump stations would have to be placed on each drainage ditch to remove rainwaters during a storm surge event.	4 Received a 4 due to the fact that it minimized the indirect impacts to the WMA where possible.	1 Received a 1 because it did not avoided a large # of pipelines. There are over 70 pipeline crossings. Many of these pipelines are small feeder pipelines that join up with a mainline pipeline south of Plan 11.	21

	Objectives Ranked (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)			Avoids Constraint (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)					
Condensed Plan ID	#1 Storm damages	#2 Reduce risk to life and health	#5 Reduce the risk of damage and loss of critical infrastructure	#1 Min. impacts to wetlands	#2 Min. impacts to diversion projects	#3 No loss of existing flood protection	#4 Avoid impacts to WMA & wetlands	#5 Min. impacts to critical infrastructure	SUM
Plan 4: Spillway to ESJ (I-10 Offset)	2 Received a 2 due to the fact that it only addressed a limited portion of the FWOP equivalent annual damages. Damages EAD . Two of the highest EAD reaches, SA-27 and SA-21 would have left be left outside of the plan.	1 Received a 1 due to the fact that the plan's tie-in point would be directly through a developed area. There would be a high risk that stages outside of the plan could be higher with the plan in place.	3 Received a 3 due to the fact that under the existing conditions the plan would prevent surges from flooding I-10 and parts of US-61. The plan did not receive a 4 because US-61 could still flood under the existing conditions west of ESJ.	2 Received a 2 due to the fact that it in most areas minimized the direct and indirect impacts to the wetlands by following the wet/dry interface. It did not receave a 3 or 4 because it still enclosed wetlands between the Belle Terre Exit and ESJ and also had direct impacts to the wetlands north of I-10.	4 Received a 4 due to the fact that it would stop before the Hope Canal Diversion and would not interfere with the proposed lateral discharges.	2 Received a 2 because the plan would disrupt the local drainage patterns northward. In most areas, a pump station would have to be placed on each drainage ditch to remove rainwaters during a storm surge event.	4 Received a 4 due to the fact that it minimized the indirect impacts to the WMA where possible.	3 Received a 3 because it did not avoided a large # of pipelines.. Many of these pipelines are small feeder pipelines that join up with a mainline pipeline south of Plan 11. The plan did get an additional point for avoiding I-10.	21
Plan 5: Spillway to Marathon	3 Received a 3 due to the fact that it left the community of Garyville and the portion Marathon refinery outside of the plan. Both these areas would see significant flooding under the existing conditions.	2 Received a 2, because the plan did reduce flooding depths to a larger area, but the plan still could increase stages in the community of Garyville.	3 Received a 3 due to the fact that under the existing conditions the plan would prevent surges from flooding I-10 and parts of US-61. The plan did not receive a 4 because US-61 could still flood under the existing conditions west of Marathon.	2 Received a 2 due to the fact that it in most areas minimized the direct and indirect impacts to the wetlands by following the wet/dry interface. It did not receave a 3 or 4 because it still enclosed wetlands between the Belle Terre Exit and Reserve Canal.	4 Received a 4 due to the fact that it would stop before the Hope Canal Diversion and would not interfere with the proposed lateral discharges.	1 Received a 1 because the plan would disrupt the local drainage patterns northward. There would be limited storage for rainfalls events, especially in the area of Reserve and Garyville. Very efficient pump stations would have to be placed on each drainage ditch to remove rainwaters during a storm surge event.	4 Received a 4 due to the fact that it minimized the indirect impacts to the WMA where possible.	1 Received a 1 because it did not avoided a large # of pipelines. There are over 70 pipeline crossings. Many of these pipelines are small feeder pipelines that join up with a mainline pipeline south of Plan 11.	20
Plan 1: Spillway to Reserve Canal	2 Received a 2 due to the fact that it only addressed a limited portion of the FWOP equivalent annual damages. Damages EAD . Two of the highest EAD reaches, SA-27 and SA-21 would have left be left outside of the plan.	1 Received a 1 due to the fact that the plan's tie-in point would be directly through a developed area. There would be a high risk that stages outside of the plan could be higher with the plan in place.	3 Received a 3 due to the fact that under the existing conditions the plan would prevent surges from flooding I-10 and parts of US-61. The plan did not receive a 4 because US-61 could still flood under the existing conditions west of Reserve Canal.	2 Received a 2 due to the fact that it in most areas minimized the direct and indirect impacts to the wetlands by following the wet/dry interface. It did not receave a 3 or 4 because it still enclosed wetlands between the Belle Terre Exit and Reserve Canal.	4 Received a 4 due to the fact that it would stop before the Hope Canal Diversion and would not interfere with the proposed lateral discharges.	2 Received a 2 because the plan would disrupt the local drainage patterns northward. In most areas, a pump station would have to be placed on each drainage ditch to remove rainwaters during a storm surge event.	4 Received a 4 due to the fact that it minimized the indirect impacts to the WMA where possible.	2 Received a 2 because it did not avoided a large # of pipelines.. Many of these pipelines are small feeder pipelines that join up with a mainline pipeline south of Plan 11.	20

	Objectives Ranked (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)			Avoids Constraint (5=High, 4=Medium High , 3=Medium, 2=Medium-Low 1=Low)					
Condensed Plan ID	#1 Storm damages	#2 Reduce risk to life and health	#5 Reduce the risk of damage and loss of critical infrastructure	#1 Min. impacts to wetlands	#2 Min. impacts to diversion projects	#3 No loss of existing flood protection	#4 Avoid impacts to WMA & wetlands	#5 Min. impacts to critical infrastructure	SUM
Plan 6: Spillway to Reserve (US-51 Protection)	2 Received a 2 due to the fact that it only addressed a limited portion of the FWOP equivalent annual damages. Damages EAD . Two of the highest EAD reaches, SA-27 and SA-21 would have left be left outside of the plan.	1 Received a 1 due to the fact that the plan's tie-in point would be directly through a developed area. There would be a high risk that stages outside of the plan could be higher with the plan in place.	2 Received a 2 due to the fact that under the existing conditions the plan would prevent surges from flooding I-10 and parts of US-61. The plan did not receive a 4 or 3 because US-61 could still flood under the existing conditions west of west of Marathon, and the plan also leaves out Reach SA-27. This reach includes the Reserve Airport and the Louisiana Nation Guard's High Water response vehicle facility. These two facilities are critical to SE LA storm response teams.	4 Received a 4 because west of Reserve Canal it stayed on the developed areas. It did not receave a 5 because it still enclosed wetlands between the Belle Terre Exit and Reserve Canal.	4 Received a 4 due to the fact that it would stop before the Hope Canal Diversion and would not interfere with the proposed lateral discharges.	1 Received a 1 because the plan would disrupt the local drainage patterns northward. A pump station would have to be placed on each drainage ditch to remove rainwaters during a storm surge event	4 Received a 4 due to the fact that it minimized the indirect impacts to the WMA where possible.	1 Received a 1 because it did not avoided a large # of pipelines. There are over 70 pipeline crossings. Many of these pipelines are small feeder pipelines that join up with a mainline pipeline south of Plan 11.	19

Plans 1-6 were eliminated from further consideration because they did not maximize the planning objectives. (See Table 3-2, objectives ranked column.) Plans that could induce flooding to communities outside of the risk reduction system or divided communities were eliminated from consideration because they were considered unacceptable.

Plan 7 and Plan 9 alignments follow the wetland/non-wetland interface through St. John the Baptist Parish. However, Plan 7 would not provide risk reduction to the town of Garyville. By increasing the length of the levee by 500 feet, Plan 9 provided risk reduction to Garyville while only minimally increasing costs. Plan 7 was thus eliminated. Plan 8 and Plan 12 would provide risk reduction to the same area. The difference between the two Plans was the tie-in points at the two closest high ground areas to prevent storm surge from flanking the levee. Plan 12 would extend into Ascension Parish and tie into the Marvin Braud pump station. Plan 8 would tie into Hwy-70 in St. James Parish adding 4 miles to the alignment. Plan 12 was carried forward instead of Plan 8 because it was less costly and the direct environmental impacts were less than Plan 8.

The four remaining structural plans were carried forward: Plan 9, Plan 10, Plan 11 and Plan 12.

Descriptions of further analyses and screening are contained in Chapter 3 of the main report.

FURTHER DEVELOPMENT OF THE LOCALIZED STORM SURGE RISK REDUCTION COMPONENT

After the release of the draft report, the team received comments on both the public acceptability of the nonstructural measures proposed and the incremental benefits associated with the the components presented in the draft report. The indication from the public was that a raising or buyout program would get very little public participation if the program were voluntary. The original assumption for the cost and benefit analysis were based on 100% participation in the draft report. In addition to the participation rate, the team also had to investigate the incremental justification of the nonstructural component as a standalone feature.

In reviewing the nonstructural plan presented in the draft report, the team determined that the benefit to cost ratio (BCR) was less than 1 (below unity). In the draft report the cost of raising and/or acquiring structures located in the 2020 and 2070 100-year floodplains was evaluated by comparing the cost of elevating the structure to the cost of acquiring the structure. In subsequent discussions with the local stakeholders and experts in the field of storm surge risk reduction measures, we determined that lower cost localized storm surge risk reduction measures could have been implemented to achieve the same level of benefits. This in turn could have raised the BCR above unity.

The key to identifying which of these localized storm surge risk reduction measures would work best to reduce the risk of storm surge-related damage in this area lies in understanding the limits and characteristics of storm surge flooding and flooding in general in St. James Parish. Based on this understanding, the team determined that methods used to address tropical/hurricane storm surge in this area had to be focused in discrete locations and had to be implemented very near the base year where damages were occurring.

The team began its detailed evaluation by reviewing the existing and future tropical/hurricane storm surge flooding in the St. James Parish area. It was determined that in 2020, the 100 yr flooding in St. James Parish was between an elevation of 6.6. to 5.2 ft NAVD 88 (Figure 4).

Figure 4. 100 yr Surge Data and Reaches in St. James Parish with Structures

SA-Name	Index_Sta	FWP100yr2020	FWP100yr2070
RSA 01	102	6.6	12.1
RSA 02	104	5.8	11.8
RSA 24	148	5.5	11.6
RSA 27	154	5.7	11.7
RSA 33	166	5.2	11.8
RSA 34	168	5.2	11.8
RSA 35	170	5.2	11.8
RSA 44	188	5.5	11.6
RSA 46	192	5.8	11.8
RSA 54	208	5.7	11.7
RSA 55	210	5.5	11.6

Based on our surge modeling data, these stages would affect between 225 to 300 homes in 2020. These stages were also very similar to the stages seen from Hurricane Isaac, but less than 30 structures were impacted in St. James during that event. In discussions with local residents and stakeholder it was determined, due to the nature of the flooding and depths, the locals were able to sandbag a large number of homes over a 24 hour period and protect these homes from damage. Unlike the eastern portion of the study area, storm surges in St. James Parish typically enter the area slower and when it does flood, the depths in the developed areas are generally less than 2.5 ft deep. Most of the developed areas have a ground elevation of ~4.5 NAVD 88. As you can see from the pictures below from Hurricane Isaac, most the flooding is in the yards. Homes with a first floor less than 6.5 were typically sandbagged (Figure 18 and 19). In some cases, temporary berms made from sand bags were used to protect a group of structures (Figure 20).

Figure 18. Gramercy Area north of 3125 during Hurricane Isaac

Figure 19. Grand Point Hurricane Isaac

Figure 20. Grand Point Hurricane Isaac (Credit St. James Parish Sheriff's Office)

We also determined that flooding that occurred south of Highway 3125 had to pass under the highway. The lowest point of the highway was above a 6 ft elevation. Surge was flowing upstream through the drainage culverts under the highway and flooding structures south of the highway.

The team at that point began to investigate the feasibility of berms and flap gates on the culverts along the highway. We identified 5 major areas within St James parish that could be addressed through localized storm surge risk reduction risk reduction measures(Figure 21):

- Berm around a group of structures in the Gramercy area North of Hwy 3125.
- Berm around a group of structures in the Grand Point area North of Hwy 3125 near Longview Park. (Grand Point North).
- Berm around a group of structures in the Grand Point area north of Hwy 3125, near the Grand Point Boat Launch (Grand Point South).
- Flap Gates and Closures on drains under Hwy 3125 to reduce risk to structures south of the highway.
- Flood proof structures north of Hwy 3125 in St. James Parish outside of the berms with a first floor below the 2020 1% AEP event.

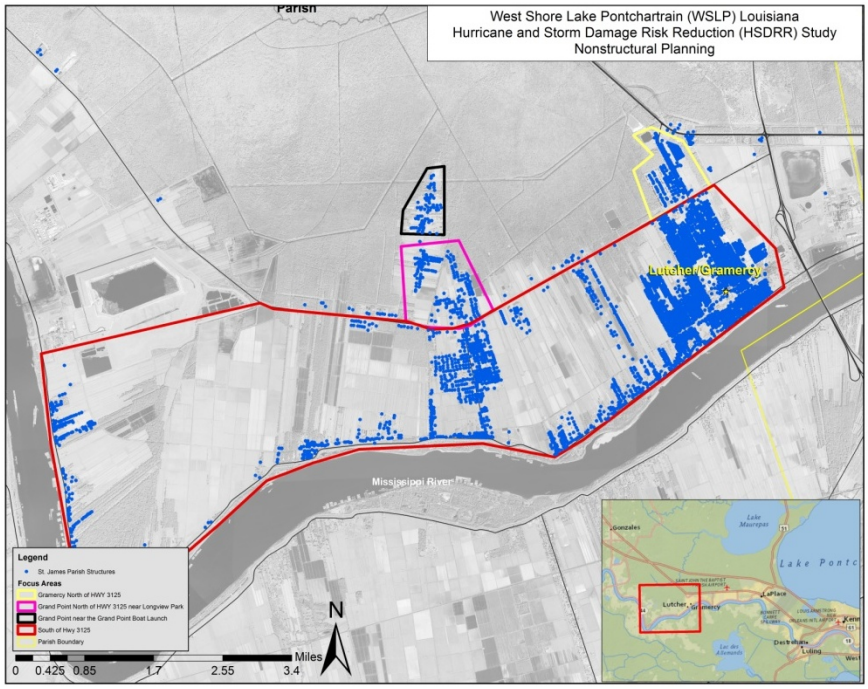


Figure 21. Areas of further development of Localized Sorm Surge Risk Reduction Plans.

Because individual berms around each structure would not be cost effective, consideration was given to small berms around a group of structures. For example, in the Gramercy area north of Hwy 3125, we reviewed the cost of three methods of localized storm surge risk reduction measures; raising each structure (Figure 22); berms around each structure; or one berm around a group of structures tying back into the Hwy 3125 (Figure 23).

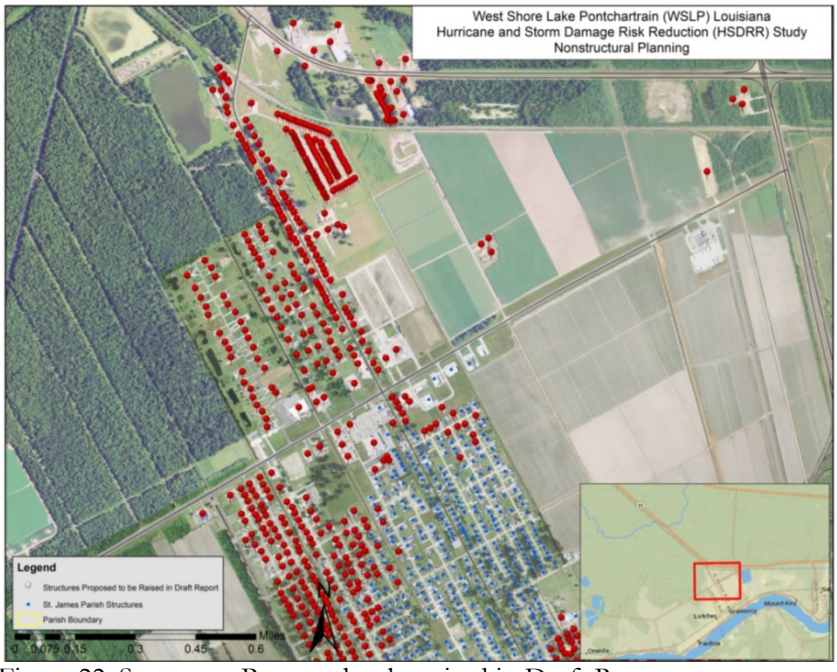


Figure 22. Structures Proposed to be raised in Draft Report.

Figure 23. Graphical Representation of a Berm around the Gramercy area.

Cost for raising structures were already developed for the draft report. Cost for berms around structures were developed based on a average perimeter around a structure and a cost per linear foot of berm. The cost for the berm around the group of structures was based on the same design of the structural as the levee, but an average ground elevation was used. In most areas, the required berm heights for a 2020 100yr level of risk reduction were less than 2.5 ft above ground level. In comparing the cost between the three options, a berm around a group of structures was the more cost efficient option (Table 5). In both the Gramercy area and in the Grand Point Areas berms around a group of structures were developed (Figure 24).

Table 5. Cost comparisons for Gramercy Area

	Top of Polder Elevation/or Targeted RR level for Existing conditions (ft NAVD88)	# Structures in Polder	# Structures with first floors less than the set polder height	Total polder construction cost	Structure by Structure Evaluation of Raising or Acquisitions (noURA)	Estimated cost for individual berms per Structures impacted (# Structures X (240 lf berm*X $800/lf) *Used ~3,500 sqft area (SQRT(3500)*4) = 240 lf
Polder 1 (Gramercy)	6.5	275	156	$15,000,000	$24,000,000	$30,000,000

To reduce risk to a large area south of Hwy 3125, it was determined, that Hwy 3125 could be used as a localized storm surge risk reduction feature (Figure 24). The roadway elevation is above a 6.5 'NAVD 88 elevation and currently under a 2020 100 yr event, tropical/hurricane storm surges only flow through the culverts under the roadway (Figure 24). By closing off the culverts with one-way flap gates and a drainage canal with a floodgate during tropical/hurricane storm surge events, the plan would provide risk reduction to 19,500 acres and 4,295 structures south of Hwy 3125.Although there are a limited number of structures that are impacted by a 6.5 'NAVD 88 surge event, this closure would prevent a large portion of the parish's critical sugarcane crops from flooding during tropical/hurricane storm surge events, although no estimates of damage and benefits to agricultural resources have been made. In addition, if the parish chooses to make future improvements to Hwy 3125, any additional height added to the highway could add to the structures risk reduction level. Currently 165 structures out of 4,295 structures south of Hwy 3125 would be impacted by a 6.5 'NAVD 88 surge event without the flapgate closures.

In order to include everyone in the evaluation the team also investigated the remaining structures that were not included in the 3 polders or in the area south of Hwy 3125. We determined that 80 structures would be outside the risk reduction provided by these features. Of these structures, only 23 of them have a first floor

elevation less than the 1% AEP storm stages in 2020 (Figure 24). The plan therefore includes elevation of 14 residential structures to the stage associated with the 2070 1% (100-year) ACE event; flood-proofing of 4 non-residential structures to 3 feet above the ground elevation; and constructing smaller berms for 5 light industrial/warehouse facilities.

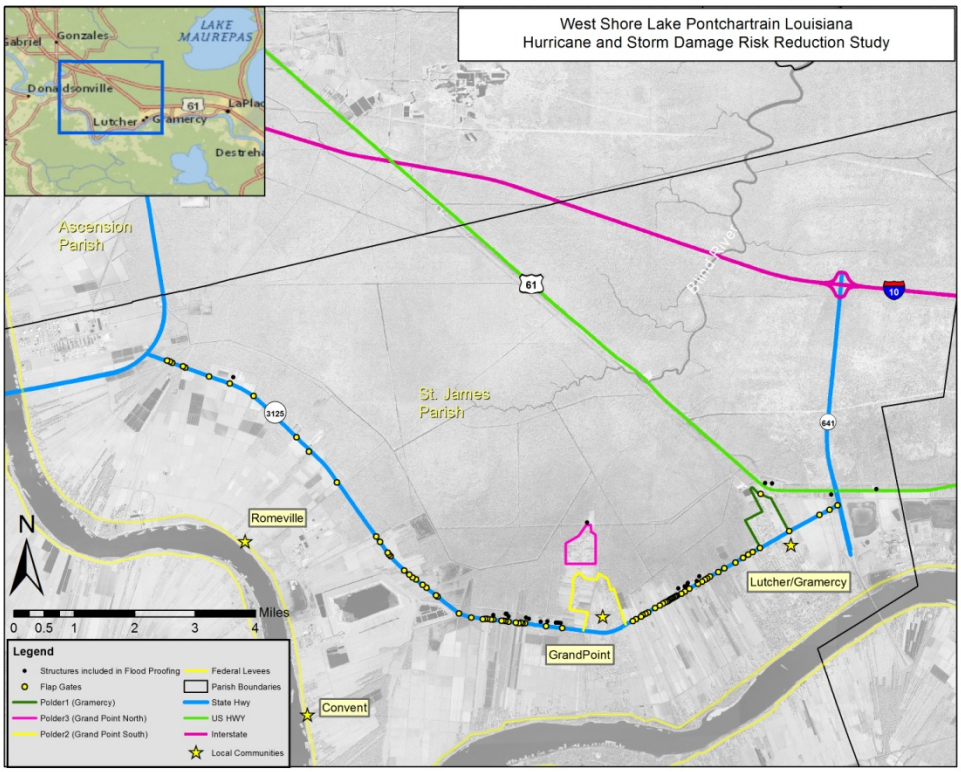


Figure 24. Final Localized Storm Surge Risk Reduction Plan for St. James

Including the optimized localized storm surge risk reduction components would reduce tropical/hurricane storm surge-related damages in St. James to the 1% AEP storm stages in 2020. The measures only provide a risk reduction above 1% AEP storm stages in 2020. In the future, the level of risk reduction provided by these measures would depend on the rate of RSLR. The level of risk reduction in year 2070 is estimated to fall between the 25 yr and 50 yr AEP storm stages. Additional efforts to investigate improvements to the berms over time were not investigated further due to the fact that the previous efforts under the draft report showed that larger localized storm surge risk reduction plans based on the 2070 1% AEP storm stages was below unity.

ENGINEERING DETAILS OF THE LOCALIZED STORM SURGE RISK REDUCTION FEATURES

Polder 1 (Gramercy Berm)

In the Gramercy area, north of Hwy 3125, a 10,100 LF berm is proposed. The berm would be constructed to a +6.5' NAVD 88 elevation. The berm would parallel both sides of Hwy 20, and parallel the railroad track

along US-61 (Airline Highway). On the south, the berm would tie into Hwy 3125 to close off the system. Hwy 3125 is key feature for all of the localized storm surge risk reduction features. The entire roadway is above a 6.5‘ NAVD 88 elevation and will be used as a tie in point for the berm. The design of the berm is based on with a 4' wide crown and 3:1 side slopes. Using local Light Detection and Ranging (LIDAR) data it was assumed that the existing ground elevation under the berm would be at an elevation of approximately 4.3 ft NAVD88. Using this assumption, the proposed berm would have an average height of 2.2 ft with an average width of 18 ft, and require 237,000 cy of compacted fill for construction. The berm would also include two floodgates to allow existing drainage to flow through the berm when not under surge events. A pump system to operate and remove rainwaters during tropical/hurricane storm events will be included in the features. The pump system will be approximately 217 cfs. The berm would be placed in a location so as not to interfere with existing local drainage.

Mobilization & Demolition	1	L.S.
Clearing and Grubbing (Area of berm location)	4	Ac.
100% Compacted Fill	237,021	C.Y.
Turf Establishment	4	Ac.
Flood Gate (10' to 14' Height)	50	LF
Pump Station (217 CFS)	1	Each
Flap Gate (36" circular)	1	Each

Polder2 (Grand Point South Berm)

In the Grand Point Area near Hwy 3125, a 14,488 LF a berm would be built, and would include a 4' wide crown and 3:1 side slopes. Similar to the Gramercy berm, it would tie into Hwy 3125 and be constructed to a 6.5' NAVD 88 elevation. Using LIDAR data it was assumed that the existing ground elevation under the berm would be approximately 4.5' NAVD 88. Using this assumption the proposed berm would have an average height of 2 ft with an average width of 16 ft, and require 273,900 cy of compacted fill for construction. The berm would also include one floodgate to allow existing drainage to flow through the berm when not under surge events. A pump system to operate and remove rain waters during tropical/hurricane storm events will be included in the features. The pump system will be approximately 382 cfs. The berm would be placed in a location so as not to interfere with existing local drainage. The berm would also be placed very near the edge of the property owners’ parcels where feasible. This would minimize the loss of use of any property.

Mobilization & Demolition	1	L.S.
Clearing and Grubbing (Area of berm location)	5	Ac.
100% Compacted Fill	273,823	C.Y.
Turf Establishment	5	Ac.
Flood Gate (10' to 14' Height)	50	LF
Pump Station (382 CFS)	1	Each

Note: A review of each component determined that every component considered for the localized storm surge *risk reduction plan, except for Polder 2 (Grand Point South), was economically justified on its own (See Table 3-8 of the main report). The USACE’s ER 1105-2-100 states that separable elements have to be incrementally justified to be included in the final recommendation. Polder 2 (Grand Point South) BCR’s was less than unity when evaluated separately. Polder 2 (Grand Point South) was removed from the overall system associated with the final recommendation.*

Polder3 (Grand Point North Berm)

In the Grand Point Area a berm proposed around the structures in the northern portion of Grand Point, near the Grand Point Boat Lunch. The berm would be 10,400 LF, and would include a 4' wide crown and 3:1 side slopes. The berm would be constructed to a 6.5 ' NAVD 88 elevation. Using local LIDAR data it was assumed that the existing ground elevation under the berm would be approximately 4‘ NAVD 88. Using this

assumption, the proposed berm would have an average height of 2.5 ft with an average width of 20 ft, and require 286,800 cy of compacted fill for construction. A pump system to operate and remove rain waters during tropical/hurricane storm events will be included in the features. The pump system will be approximately 140 cfs. The berm would be placed in a location so as not to interfere with existing local drainage. The berm would also be placed very near the edge of the property owners' parcels where feasible. This would minimize the loss of use of any property.

Mobilization & Demolition	1	L.S.
Clearing and Grubbing (Area of berm location)	4	Ac.
100% Compacted Fill	286,729	C.Y.
Turf Establishment	4	Ac.
Pump Station (140 CFS)	1	Each

Storm Surge **Risk Reduction Under LA Highway 3125**

In addition to the berms north of Hwy 3125, the proposal is to use 13 miles of Hwy 3125 and its existing foundation as a localized storm surge risk reduction feature. Currently the roadway elevation is above a 6.5' NAVD88 elevation. Currently, the 1% AEP storm stages in 2020 flow through the culverts under the roadway in the opposite direction from natural drainage. By closing off the culverts with one-way flap gates and a drainage canal with a floodgate during surge events, the plan would provide risk reduction to 19,500 acres and 4,295 structures south of Hwy 3125. The plan includes 145 flap gated closures, two floodgates and two small berms (Noranda and Uncle Sam). The Noranda berm ties the highway into high ground east of Gramercy. The Uncle Sam berm divides the developed area behind Hwy 3125 from an area that is primarily agricultural land. The total length of the berms is approximately 645 LF. They would be built in the same methods as the Gramercy and Grand Point berms. Due to the nature of the flooding south of Hwy 3125, it is assumed that the 19,500 acres would have ample storage capacity to hold any rainfall during the surge events. Even if some acres of crops are flooded from rainfall it would be much less than if the surge was allowed to flow under Hwy 3125.

Flap Gate (30" circular)	69	Each
Flap Gate (36" circular)	19	Each
Flap Gate (48" circular)	3	Each
Aluminum Slide Gate (48" x 72")	1	Each
Flood Gate (10' to 14' Height)	90	LF
Noranda berm		
Mobilization & Demolition	1	L.S.
Clearing and Grubbing (Levee)	1	Ac.
100% Compacted Fill (3)	8,973	C.Y.
Turf Establishment	1	Ac.
Uncle Sam berm		
Mobilization & Demolition	1	L.S.
Clearing and Grubbing (Levee)	1	Ac.
100% Compacted Fill (3)	5,120	C.Y.
Turf Establishment	1	Ac.

Remaining Structures in St. James Parish

The plan includes 14 residential structures that would be raised to the stage associated with the 2070 1% (100-year) AEP event; 4 non-residential structures would be flood proofed to 3 feet above the ground elevation; and smaller berms would be constructed for 5 light industrial/warehouse facilities. The final design will be refined in PED once additional information each structures is collected. The table below provides the information used for cost estimating purposes. The 14 residential structures are being raised to the 2070 height because it is more cost effective to raise a home once. The final method for raising and flood proofing will be refined during PED and could differ between residential structures and non-residential structures. The pictures below provide examples of the different methods.

14 residential structures:

ID	Structure Type	Existing 1st Floor Elevation (NAVD88)	Final Raised Elevation (NAVD88)
1392	1STY-PIER	3.76	8
367	1STY-PIER	4.91	7
611	1STY-SLAB	5.37	6
612	1STY-SLAB	4.67	7
624	1STY-SLAB	3.24	8
622	1STY-SLAB	3.72	8
621	1STY-SLAB	3.7	8
1396	1STY-SLAB	3.53	8
1395	1STY-SLAB	3.34	8
1394	1STY-SLAB	4.41	7
237	1STY-SLAB	4.51	7
236	1STY-SLAB	4.5	7
232	1STY-SLAB	5.32	6
1393	1STY-SLAB	3.8	8

4 non-residential structures would be flood proofed to 3 feet above the ground elevation:

ID	Type of Structure	First Floor Elevation (NAD88)	~ Square Feet of Structure
617FP	EAT	3.71	3,251
1FP	PROF	3.76	22,800
618FP	PROF	4.95	22,800
3FP	PUBL	4.51	7,815

5 light industrial/warehouse facilities with berms:

ID	Type	First Floor Elevation (NAD88)	Estimated Square Feet	Perimeter	Perimeter With Buffer
615B	COM	5.02	10431.7	408.54	568.54
614B	COM	4.39	10431.7	408.54	568.54
638B	COM	4.73	10431.7	408.54	568.54
114B	IND	4.99	10431.7	408.54	568.54
111B	IND	5.65	10431.7	408.54	568.54

Structures Foundation walls extended:

Structures elevated on piers, post, piles, or columns:

Low Flood Wall:

Berm around non-residential structure:

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION PROJECT
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX F

REFERENCES

Annex A: Acronyms
Annex B: Literature Cited
Annex C: Index

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION PROJECT
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX F

Annex A
Acronyms

AAHUs	Average Annual Habitat Units
ACE	Annual Chance Exceedance Event
ACHP	Advisory Council on Historic Properties
ADCIRC	Advanced circulation modeling
AEP	Annual exceedance probability
AM&M	Adaptive Management & Monitoring
ARDC	Amite River Diversion Canal
ASACW	Assistant Secretary of the Army for Civil Works
ATV	All Terrain Vehicle
BCR	Benefit to cost ratio
BLH	Bottomland hardwood
BLH1	Bonnet Carre Bottomland Hardwood Restoration
BMP	Best management practices
BR	Baton Rouge
CAA	Clean Air Act
CBRD	Convent Blind River Diversion
CC	Coefficient of Conservatism
CEMVN	U.S. Army Corps of Engineers, Mississippi Valley Division, New Orleans District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CIAP	Coastal Impact Assistance Program
CPRAB	Coastal Protection Restoration Authority of Louisiana Board
CRMS	Coastwide Reference Monitoring System
CWA	Clean Water Act
CWPPRA	Coastal Wetlands Planning, Protection and Restoration Act
cy	Cubic yards
dBA	A-weighted decibels
DIVR	Division Regulation
DO	Dissolved oxygen

Draft Report	Draft Integrated Feasibility Report and Environmental Impact Statement
EAD	Equivalent annual damages
EFH	Essential Fish Habitat
EJ	Environmental Justice
EJView	Environmental Protection Agency Mapping
EO	Executive Order
EPA	Environmental Protection Agency
EQ	Environmental Quality
ER	Engineering Regulation
ESA	Environmental Site Assessment
ESA	Endangered Species Act
ESJHS	East St. John High School
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
Final Report	Final Integrated Feasibility Report and Environmental Impact Statement
FIRM	Insurance rate maps
FPPA	Farmland Protection Policy Act
FQI	Floristic Quality Indices
FRM	Flood risk management
ft	Feet
FWCA	Fish and Wildlife Coordination Act
FWCAR	Coordination Act Report
GIS	Geographical information system
HEC-FDA	Hydrologic Engineering Center Flood Damage Analysis
HHS	U.S. Department of Health and Human Services
HI	Hydrologic Indices
HIS	Habitat Suitability Index
HSDRRS	Hurricane and Storm Damage Risk Reduction System
HTRW	Hazardous, Toxic, and Radioactive Waste
Hwy	Highway

I-10	Interstate 10
I-55	Interstate 55
LaDOTD	Louisiana Department of Transportation and Development
LCA	Louisiana Coastal Area
LDWF	Louisiana Department of Wildlife and Fisheries
LERRD	Land, Easements, Rights-Of-Way, Relocation, and Disposal Areas
LF	Linear foot
LIDAR	Light Detection and Ranging data
LNHP	Louisiana Natural Heritage Program
LPV	Lake Pontchartrain and Vicinity
MBI	Mitigation Banking Instrument
MII	Micro-Computer Aided Cost Estimating System
MOU	Memorandum of Understanding
MR&T	Mississippi River and Tributaries
MRGO	Mississippi River Gulf Outlet Canal
MRL	Mississippi River Levee
MS	Mississippi
NAAQS	National Ambient Air Quality Standards
NAVD	North American Vertical Datum
NCC	Notice of construction completion
NED	National Economic Development
NEPA	National Environmental Policy Act
NER	National Ecosystem Restoration
NFIP	National Flood Insurance Program
NFS	Non-Federal sponsor
NGO	Non-Governmental Organizations
NOAA	National Oceanic and Atmospheric Administration
NOLA	New Orleans
NORM	Naturally occurring radioactive materials
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places

OCPR	Office of Coastal Protection and Restoration, Louisiana
OMRR&R	Operation, maintenance, repair, rehabilitation and replacement
OSE	Other Social Effects
OSE	Other Social Effects
PED	Preconstruction engineering and design
PIER 36	Programmatic Individual Environmental Report for Pontchartrain and Vicinity
PLD	Pontchartrain Levee District
PMP	Project Management Plan
PO-29	River Reintroduction into Maurepas Swamp
PPA	Project Partnership Agreement
PPT	Parts per thousand
Principles and Guidelines	1983 Economic and Environmental Principles and Guidelines for Water and Related Land Implementation Studies
REC	Recognized environmental conditions
RED	Regional Economic Development
REP	Real Estate Plan
ROW	Right of way
RSLR	Relative sea level rise
SHPO	State Historic Preservation Office
SLR	Sea level rise
SMART	Specific, Measurable, Attainable, Risk Informed, Timely
STWAVE	Steady-State Spectral Wave
SVI	Submergence Vulnerability Indices
SWMP1	Swamp Mitigation Bank Credit Purchase
SWMP2	Blind River Swamp Restoration
SWMP3	Bonnet Carre Swamp Restoration
SWMP4	Maurepas Crawfish Ponds Restoration
SWMP6	Lutcher Polder Farmlands Swamp Restoration
SWPPP	Stormwater Pollution Prevention Plan
T&E	Threatened and Endangered
TMDL	Total maximum daily load
TSP	Tentatively selected plan

TY	Target Year
URA	Uniform Relocation Assistance
US-44	U.S. Highway 44
US-51	U.S. Highway 51
US-61	U.S. Highway 61
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WIK	Work-in-kind
WMA	Wildlife Management Area
WRDA	Water Resources Development Act
WSE	Water surface elevations
WSLP	West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction
WVA	Wetland value assessment

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION PROJECT
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX F

Annex B
Literature Cited

American Bird Conservancy. 2009. Saving Migratory Birds for Future Generations: The Success of the Neotropical Migratory Bird Conservation Act. American Bird Conservancy. 23pp.

American Society of Civil Engineers (ASCE). 2013. Louisiana: Infrastructure report card. www.infrastructurereportcard.org/louisiana/louisiana-overview accessed May 22, 2013.

Atilla, N., N. Rabalais, W. Morrison, W. Mendenhall, C. Normandeau, Q. Dortch., R.E. Turner. 2007. Phytoplanton community Composition in Lake Pontchartrain. Abstract, American Society of Limnology and Oceanography.

Baroch, M.J., M. Hafner, T.L. Brown, J.J. Mach, R.M. Poche. 2002. Nutria (Myocaster coypus) in Louisiana. Wildlife Damage Management, Internment Center for Other Publications in Wildlife Management. http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1045&context=icwdmother#page=4.

Battelle. 2005. Phase 1 Assessment of Potential Water Quality and Ecological Risk and Benefits from a Proposed Reintroduction of Mississippi River Water into the Maurepas Swamp. Prepared for the USEPA, Region 6.

Beyer, G.E., A. Allison, and H.H. Kopman. 1906. List of Birds of Louisiana. University of California Press on behalf of the American Ornithologist's Union.

Broussard, W.P. 2008. A Century of Land Use and Water Quality in Watersheds of the Continental U.S. MS thesis, Louisiana State University, Baton Rouge, Louisiana. http://etd.lsu.edu/docs/available/etd-07072008-182001/. Last accessed on May 28, 2012.

Brown, K.M., G. George, and W. Daniel. 2010. Urbanization and a threatened freshwater mussel: evidence from landscape scale studies. Hydrobiologia 655:189-196.

California Department of Transportation (Caltran). 1998. Technical Noise Supplement by the California Department of Transportation Environmental Program Environmental Engineering-Noise, Air Quality, and Hazardous Waste Management Office. October 1998 Page 24-28.

Conner, W.H., and J.W. Day. 1976. Productivity and Composition of a Baldcypress-Water Tupelo Site and a Bottomland Hardwood Site in a Louisiana Swamp. American Journal of Botany, Vol. 63, No. 10, pp. 1354–1364.

Council on Environmental Quality. 1997. Considering Cumulative Effects Under the National Environmental Policy Act. Council on Environmental Quality.

Cretini, K.F., Visser, J.M., Krauss, K.W.,and Steyer, G.D. 2012. Development and use of floristic quality index for coastal Louisiana marshes. Environmental Monitoring and Assessment 184:2389-2403.

Day, J.W., Jr., C.A.S. Hall, W.M. Kemp, A. Yanez-Arancibia. 1989. Estuarine Ecology. John Wiley and Sons, New York. 558 pp.

Demcheck, D.K., R.W. Tollett, S.V. Mize, S.C. Skrobialowski, R.B. Fendick Jr., C.M. Swarzenski, and S. Porter. 2004. Water Quality in the Acadian-Pontchartrain Drainages, Louisiana and Mississippi, 1999-2001. U.S. Geological Survey Circular 1232.

Dundee, H.A., and D.A. Rossman. 1989. The Amphibians and Reptiles of Louisiana. Louisiana State University Press, Baton Rouge.

Farris, G.S., G.J. Smith, M.P. Crane, C.R. Demas, L.L. Robbins, and D.L. Lavoie, eds. 2007. Science and the storms—the USGS response to the hurricanes of 2005. U.S. Geological Survey Circular 1306. http://pubs.usgs.gov/circ/1306/. Last accessed on May 28, 2013.

Federal Emergency Management Agency. WYO and Direct Data by Community with County and State. 1/28/2013.

Federal Highway Administration. 2007. "Special Report: Highway construction Noise: Measurement, Prediction, and Mitigation, Appendix A Construction Equipment Noise Levels and Ranges." www.fhwa.dot.gov/environment/noise/highway/hcn06.htm.

Fox, David M., P.C. Stouffer, D.A. Rutherford, W.E. Kelso, M. La Peyre, R. Bambarger. 2007. Impacts of a Freshwater Diversion on Wildlife and Fishes in the Maurepas Swamp. Prepared for: U.S. Environmental Protection Agency Region 6. Prepared by: Louisiana State University, School of Renewable Natural Resources.

Frazier, D. E. 1967. Recent deltaic deposits of the Mississippi River, their development and chronology. Transactions Gulf Coast Association of Geological Societies 17:287-315.

Garrison, C.R. 1999. Statistical Summary of Surface-Water Quality in Louisiana—Lake Pontchartrain-Lake Maurepas Basin, 1943-95. Louisiana Department of Transportation and Development Water Resources Technical Report No. 55G. http://la.water.usgs.gov/publications/pdfs/TR55G.pdf. Last accessed on May 22, 2013.

Gosselink, J.G. 1984. The Ecology of Delta Marshes of Coastal Louisiana: A Community Profile. U.S. Fish and Wildlife Service Report FWS/OBS-84/09. http://www.nwrc.usgs.gov/techrpt/84-09.pdf. Last accessed on May 22, 2013.

Gulf of Mexico Fishery Management Council (GMFMC). 2004. Final Environmental Impact Statement for the generic essential fish habitat amendment to the following fishery management plans of the Gulf of Mexico: shrimp fishery of the Gulf of Mexico, red drum fishery of the Gulf of Mexico, reef fish fishery of the Gulf of Mexico, stone crab fishery of the Gulf of Mexico, coral and coral reef fishery of the Gulf of Mexico, spiny lobster fishery of the Gulf of Mexico and South Atlantic, coastal migratory pelagic resources of the Gulf of Mexico and South Atlantic. Gulf of Mexico Fishery Management Council. Tampa, Florida. http://www.gulfcouncil.org/Beta/GMFMCWeb/downloads/Final%20EFH%20EIS.pdf

Hastings, R.W. 2001. Comparative distribution and abundance of catfishes in an oligohaline upper estuary. Proceedings of the Louisiana Academy of Sciences. Accessed 1 April 2009 at http://findarticles.com/p/articles/mi_hb3536/is_2001_Annual/ai_n28891492/ Last accessed April 1 2009.

Hastings, R.W.. 2009. The Lakes of Pontchartrain: Their History and Environments. Jackson, MS: University Press of Mississippi. 272 pp.

Hoeppner, S.S., G.P. Shaffer, and T.E. Perkins. 2008. Through droughts and hurricanes: Tree mortality, forest structure, and biomass production in a coastal swamp targeted for restoration in the Mississippi River Deltaic Plain. Forest Ecology and Management 256:937-948.

Keddy, P.A., D. Campbell, T. McFalls, G.P. Shaffer, R. Moreau, C. Dranguet, and R. Heleniak. 2007. The Wetlands of Lakes Pontchartrain and Maurepas: Past, Present and Future. Environmental Reviews 15:43-77. http://www.drpaulkeddy.com/pdffiles/Keddy%20et%20al.%202007%20--%20Env%20Revs%20--%20Lake%20Ponchartrain%20Wetlands%20review.pdf. Last accessed May 22, 2013.

Landry, Jr., S.P. 1967. Frenier Beach Hurricane Storm Surge Revisited. Volume 39, Number 4, July/August 1996 of the *Consultant*.

Lane, R.R., H.S. Mashriqui, G.P. Kemp, J.W. Day. J.N. Day, and A. Hamilton. 2003. Potential nitrate removal from a river diversion into a Mississippi delta forested wetland. Ecological Engineering 20:237-249.

Loden, M. S., 1978. Life history and seasonal abundance patterns of aquatic Oligochaeta in four southeastern Louisiana habitats. Ph.D. Thesis, Louisiana State Univ., Baton Rouge, 132 pp.

Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority. 1998. Coast 2050: Toward a Sustainable Coastal Louisiana. Louisiana Department of Natural Resources. Baton Rouge. LA. 161 p

Louisiana Department of Environmental Quality (LDEQ). 2011. Lower Amite River Watershed TMDL for Biochemical Oxygen-Demanding Substances-Phase I. http://www.deq.louisiana.gov/portal/portals/0/technology/tmdl/pdf/Final_Lower_Amite_River_040303_TMDL_Report_03302011.pdf. Last accessed on August 13, 2013.

Louisiana Department of Wildlife and Fisheries (LDWF). 2005. WMA Maurepas Swamp. http://www.wlf.louisiana.gov/hunting/wmas/wmas/list.cfm?wmaid=58. Accessed May 22, 2013.

Louisiana State Threatened and Endangered Species and Rare and Unique Habitats Coordination. http://www.wlf.louisiana.gov/wildlife/species-parish-list?tid=259&type_1=fact_sheet_animal. Last accessed June 6, 2013.

Mitsch, W.J., and J.G. Gosselink. 1993. Wetlands. Van Nostrand Reinhold, New York. 722 pp.

Moody's Analytics. 2008. Historical Data and Future Projections for the Parishes of Louisiana. 12/28/2008.

Moody's. 2013. Moody's Analytics. Economy.com. Last accessed June 6, 2013.

Mousavi, M.E., J.L. Irish, A.E. Frey, F. Olivera, and B.L. Edge. 2011. Global warming and hurricanes: the potential impact of hurricane intensification and sea level rise on coastal flooding. Climate Change 104:575-597.

National Oceanic and Atmospheric Administration (NOAA). 2013. NOAA Fisheries Habitat Conservation Division Essential Fish Habitat website. http://sero.nmfs.noaa.gov/hcd/efh.htm. accessed August 14, 2013

National Oceanic and Atmospheric Administration (NOAA). 2013a. Hurricane tracks within 65 nautical miles of Laplace, Louisiana http://csc.noaa.gov/hurricanes/# accessed August 14, 2013.

National Oceanic and Atmospheric Administration (NOAA). 2013b. Mean tidal range at New Canal USGS station, Lake Pontchartrain. http://tidesandcurrents.noaa.gov/tides09/tab2ec4.html Accessed August 14, 2013

Natural Resources Conservation Service. 2013. National Soil Survey Handbook, Title 430-VI. Available online at http://soils.usda.gov/technical/handbook/. Accessed: May 23, 2013.

Odum, E.P. 1980. The status of three ecosystem-level hypotheses regarding salt marsh estuaries. Tidal subsidy, outwelling and detritus based food chains. Pages 485–495 in V.S. Kennedy (ed.) Estuarine Perspectives, Academic Press, New York.

Patil, A. and Z.Q. Deng. 2008. Watershed Scale Variation in Water Quality in Lake Pontchartrain Basin. From American Society of Civil Engineers World Environmental and Water Resources Congress 2008. http://ascelibrary.org/doi/pdf/10.1061/40976%28316%29641. Last accessed on May 22, 2013.

Penland, S., A. Beall and J. Kindinger, eds. 2002. Environmental Atlas of the Lake Pontchartrain Basin. New Orleans, LA: Lake Pontchartrain Basin Foundation. U.S. Geological Survey Open File Report 02-206.

Philomena, A.L. 1983. The Distribution of Macrobenthos in Barataria Basin, Louisiana. Louisiana State University, Baton Rouge 280 pp.

Poirrier, M.A., E.A. Spalding,, and C.D. Franze, 2009. Lessons learned from a decade of assessment and restoration studies of benthic invertebrates and submersed aquatic vegetation in Lake Pontchartrain. Journal of Coastal Research, SI(54), 88–100. West Palm Beach (Florida), ISSN 0749-0208.

Saucier, R. R. 1963. Recent Geomorphic History of the Pontchartrain Basin. Coastal Studies Series No. 9. Louisiana State Univ. Press, Baton Rouge, Louisiana. 114 p.

Shaffer G.P., Thaïs E. Perkins, Susanne Hoeppner, Susan Howell, Heath Benard, and A. Carol Parsons. 2003. Ecosystem Health of the Maurepas Swamp: Feasibility and Projected Benefits of a Freshwater Diversion. Prepared for: The U.S. Environmental Protection Agency. 105 pp.

Shaffer, G.P., W.B. Wood, S.S. Hoeppner, T.E. Perkins, J. Zoller, and D. Kandalepas. 2009. Degradation of Baldcypress-Water Tupelo Swamp to Marsh and Open Water in Southeastern Louisiana, U.S.A.: An Irreversible Trajectory? Journal of Coastal Research, Special Issue 54:152-165.

Sikora, W.B. and B. Kjerfve. 1985. Factors Influencing the Salinity Regime of Lake Pontchartrain, Louisiana, a Shallow Coastal Lagoon: Analsis of a Long-Term Data Set. Estuaries 8(2A):170-180. http://geotest.tamu.edu/userfiles/167/50.pdf. Last accessed on May 22, 2013.Kryter, K.D. 1994. The Handbook of Hearing and the Effects of Noise. Academic Press, San Diego, CA.

Sikora, W.B., and B. Kjerfve. 1985. Factors Influencing the Salinity Regime of Lake Pontchartrain, Louisiana, a Shallow Coastal Lagoon: Analysis of a Long-Term Data Set. Estuaries Vol. 8, No. 2A, p. 170–180.

Snedden, G.A., and Swenson, E.M., 2012, Hydrologic index development and application to selected Coastwide Reference Monitoring System sites and Coastal Wetlands Planning, Protection and Restoration Act projects: U.S. Geological Survey Open-File Report 2012–1122, 25 p.

Stone, J.H., N.A. Drummond, L.L. Cook, E.C. Theriot, and D.M. Lindstedt. 1980. The distribution and abundance of plankton of Lake Pontchartrain, Louisiana, 1978. Pp437-590 in J.H. Stone, ed. Environmental Analysis of Lake Pontchartrain, Louisiana, Its Surrounding Wetlands, and Selected Land Uses. Fols 1 and 2. Publication no. LSU-CEL-80-089. Center for Wetland Resources, LSU Baton Rouge.

Stormwater Pollution Prevention Plans for Construction Activities. http://cfpub.epa.gov/npdes/stormwater/swppp.cfm. Last accessed on May 22, 2013.

Stouffer, P.C., and J.A. Zoller. 2006. Use of Lake Maurepas Wetlands by Migrating Birds. PBRP Research. Highlight. http://www2.selu.edu/orgs/pbrp/redesign_documents/PBRP_RH_4.pdf. Last accessed on May 22, 2013.

Swarzenski, C.M., T.W. Doyle, and T.G. Hargis. 2005. Pore-Water and Substrate Quality of the Peat Marshes of the Barataria Preserve, Jean Lafitte National Historical Park and Preserve, and Comparison with Penchant Basin Peat Marshes, South Louisiana, 2000-2002. USGS Scientific Investigations Report 2005-5121. http://water.usgs.gov/nps_partnership/jela.php. Last accessed on May 22, 2013.

Tate, J.N., A.R. Carrilo, R.C. Bergeer, and B.J. Thibodeaux. 2002. Salinity Changes in Pontchartrain Basin Estuary, Louisiana, Resulting from Mississippi River-Gulf Outlet Partial Closure Plans with Width Reduction. Technical Report ERDC/CHL TR-02-12. Vicksburg, MS: U.S. Army Engineer Research and Development Center. http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA408114. Last accessed on May 22, 2013.

Tinkle, D.W. 1955. Observations of reptiles and amphibians in a Louisiana swamp. Texas Tech College, Lubbock, Texas. 17 pp.

Turner, R.E., Q. Dortch, D. Justic, and E.M. Swenson. 2002. Nitrogen loading into an urban estuary: Lake Pontchartrain (Louisiana, U.S.A.). Hydrobiologia 487:137-152.

U.S. Census Bureau (USCB). State and County Quick Facts. http://quickfacts.census.gov/qfd/states/22/22095.html; http://quickfacts.census.gov/qfd/states/22/22089.html; http://quickfacts.census.gov/qfd/states/22/22093.html Last accessed on August 14, 2013..

U.S. Army Corps of Engineers (USACE). 2004. Louisiana Coastal Area (LCA) Ecosystem Restoration Study. November 2004. Final. Volume 2: Programmatic Final Environmental Impact Statement.

U.S. Army Corps of Engineers (USACE). 2008. Integrated Final Report to Congress and Legislative Environmental Impact Statement for the Mississippi River – Gulf Outlet Deep-Draft De-authorization Study Volume 1 MAIN REPORT. USACE, New Orleans, LA November 2007 (Revised June 2008).

U.S. Army Corps of Engineers (USACE). 2010a. Louisiana Coastal Area Ecosystem Restoration Study Volume IV of VI Final Integrated Feasibility Study and Supplemental Environmental Impact Statement for the Small Diversion at Convent/Blind River, St. James Parish, Louisiana. October 2010. http://www.lca.gov/Projects/13/Default.aspx

U.S. Army Corps of Engineers (USACE). 2010b. Louisiana Coastal Area Ecosystem Restoration Study Volume II of VI. Final Integrated Feasibility Study and Supplemental Environmental Impact Statement for the Amite River Diversion Canal Modification Ascension and Livingston Parishes, Louisiana. December 2010.

U.S. Army Corps of Engineers (USACE). IER 36 - Lake Ponchartrain and Vicinity (LPV) HSDRRS Mitigation, Orleans, Plaquemines, St. Bernard, St. Charles, St. John the Baptist, St. Tammany Parishes, LA.http://www.nolaenvironmental.gov/nola_public_data/projects/usace_levee/docs/original/FinalPIER36LPVHSDRRSMit.pdf

U.S. Army Corps of Engineers (USACE). 2013. Final, Volume I, Comprehensive Environmental Document, Phase I, Greater New Orleans Hurricane and Storm Damage Risk Reduction System. U.S. Army Corps of Engineers, New Orleans District, Louisiana, May 2013.

U.S. Department of Agriculture. 2013. Soil Survey: St. James and St. John the Baptist Parish, Louisiana. http://soils.usda.gov/survey//online_surveys/louisiana/stj-stjbLA1973/StJ-StJB.pdf. Accessed March 28, 2013.

U.S. Environmental Protection Agency. 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Report 550/9-47-004.

U.S. Geological Survey. 2000. Nutria, Eating Louisiana's Coast. http://www.nwrc.usgs.gov/factshts/020-00.pdf. National Wetland Research CenterLast accessed on May 22, 2013.

Watson, M.B., C.J. Killebrew, M.H. Schurtz, and J.L. Landry. 1981. A Preliminary Survey of Blind River, Louisiana. In L.A. Krumholtz, ed. The Warmwater Fisheries Symposium, A National Symposium on Fisheries Aspects of Warmwater Streams. American Fisheries Society, Knoxville, TN. Pp. 303-319.Lee Wilson and Associates, Inc. 2001. Diversion into the Maurepas Swamps. Contract No. 68-06-0067, WA No. 5-02. U.S. Environmental Protection Agency, Dallas, TX.

Wekeley, J.S., and T.H. Roberts. 1996. Bird distribution and forest zonation in a bottomland hardwood wetland. Wetland 6: 296–308.

West Shore Lake Pontchartrain FIS-EIS, Habitat Analysis Map. Map ID: USGS-NWRC 2013-11-0021, Map Date: May 02, 2013. Map produced by U.S. Department of the Interior, U.S. Geological Survey, National Wetlands Research Center, Coastal Restoration Assessment Branch, Baton Rouge, LA.

Wetlands, 3rd Edition. John Wiley & Sons, Inc. New York. 920 pp.

Wu, K and Y.J. Xu. 2007. Long-term freshwater inflow and sediment discharge into Lake Pontchartrain in Louisiana, USA. Hydrological Sciences Journal 52(1):166-180.

Zganjar, C., G. Frierson, K. Westphal, P. McCarty, S. Bridges, S. Penland. 2002. Environmental Atlas of the Lake Pontchartrain Basin. http://pubs.usgs.gov/of/2002/of02-206/env-issues/change-maurepas.html. Last accessed May 20, 2013.

Zoller, J. A. 2004. Seasonal differences in bird communities of a Louisiana swamp and manipulation of the breeding density of Prothonotary warblers. M.S. Thesis, Southeastern Louisiana University, Hammond, LA, USA.

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION PROJECT
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX F

Annex C

Index

Flood, flooding ..... i, ii, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, 2-3, 2-4, 2,7, 2-9, 2-11, 2-11, 2-13, 2-14, 2-17, 3-2, 3-3, 3-4, 3-5, 3-12, 4-3, 4-4, 5-4, 8-1
Goals, study goal 1-6
Hurricanes .....i, ii, 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, 2-6, 2-7, 2-9, 2-11, 2-12, 2-13, 2-14, 2-15, 2-16, 2-28, 2-29, 3-9, 4-3, 4-1, 4-4, 4-5, 4-6, 4-8, 4-9, 4-10, 4-11, 4-15, 4-16, 4-18, 4-20, 4-22, 5-1, 5-3, 5-6, 7-1, 8-1
Measures .....i, ii, 1-3, 1-5, 2-5, 2-9, 2-14, 3-1, 3-2, 3-3, 3-4, 3-6, 3-7, 3-9, 4-1, 4-2, 4-3, 4-5, 4-6, 4-7, 4-8, 4-9, 4-10, 4-19, 4-22, 5-1, 5-2, 5-3, 5-6, 6-2, 6-3, 6-4, 6-5
Needs 1-2, 1-2, 1-3, 1-4, 1-5, 1-6
Objectives 1-5, 1-6, 3-1, 3-2, 3-4, 3-13
Opportunities .....i, 1-3, 1-4, 1-5, 1-6, 2-18, 3-1, 3-2, 4-8, 4-22, 6-3, 6-4
Problems 1-3, 1-5, 1-6, 2-5, 3-1, 3-2, 4-19, 6-4
St. Charles Parish ..... i, 1-1, 1-2, 1-4, 2-7, 2-9, 2-11, 2-13, 2-14, 2-15, 2-17, 2-25, 3-7, 3-9, 4-1, 4-3, 4-6, 4-8, 4-9, 4-10, 4-11, 4-12, 5-6, 6-1, 6-4, 7-1, 8-1
St. James Parish ..... i, 1-1, 1-2, 1-4, 2-7, 2-9, 2-11, 2-13, 2-14, 2-15, 2-20, 2-25, 2-27, 3-4, 3-5, 3-7, 3-8, 3-9, 3-12, 4-1, 4-2, 4-3, 4-6, 4-8, 4-9, 4-10, 4-12, 4-22, 5-1, 5-6, 6-1, 6-4, 7-1, 7-2, 8-1
St. John Parish..... i, 1-1, 1-2, 1-4, 1-7, 2-7, 2-9, 2-11, 2-12, 2-13, 2-14,2-15, 2-16, 2-25, 3-3, 3-4, 3-7, 3-9, 3-13, 4-1, 4-3, 4-6, 4-8, 4-9, 4-10, 4-11, 4-12, 5-6, 5-7, 6-1, 6-4, 7-1, 7-2, 8-1
Sea leve change, sea level rise, relative sea level rise. i, 1-2, 2-2, 2-3, 2-5, 2-7, 2-9, 2-16, 2-17, 2-19, 2-20, 2-22, 2-23, 2-24, 2-26, 3-2, 3-5, 3-6, 3-10, 3-12, 4-15, 4-16, 4-18, 5-3
Storm surge.i, 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 2-5, 2-7, 2-8, 2-9, 2-11, 2-12, 2-13, 2-14, 2-15, 2-16, 2-18 , 2-19, 2-20, 2-28, 2-29, 3-2, 3-3, 3-4, 3-5, 3-6, 3-7, 3-8, 3-10, 3-12, 4-1, 4-4, 4-5, 4-6, 4-7, 4-8, 4-9, 4-10, 4-11, 4-15, 4-16, 4-17, 4-18, 4-19, 4-20, 4-22, 5-1, 5-3, 5-6, 6-4, 8-1
Levees .....i, ii, 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, 2-1, 2-3, 2-4, 2-5, 2-13, 2-14, 2-26, 2-27, 3-3, 3-4, 3-7, 3-8, 3-9, 3-10, 3-11, 3-12, 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 4-8, 4-9, 4-10, 4-11, 4-12, 4-13, 4-15, 4-16, 4-17, 4-18, 4-19, 4-20, 4-21, 4-22, 5-1, 5-2, 5-3, 5-4, 5-5, 6-3, 6-5, 7-1, 8-1

WEST SHORE LAKE PONTCHARTRAIN
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
FINAL INTEGRATED FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

VALUE ENGINEERING

APPENDIX G

U.S. ARMY CORPS OF ENGINEERS

NEW ORLEANS DISTRICT

VALUE ENGINEERING REPORT:

West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction

Feasibility Phase

(Update Supplement to VE Study CEMVN-00-10)

February 2014

CEMVN-VE-14-02

Point of Contact: Frank Vicidomina, PE, CVS-L

CEMVN-PM; (504) 862-1251

VALUE ENGINEERING REPORT

West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction

Feasibility Phase

(Update Supplement to VE Study CEMVN-00-10)

February 2014

CEMVN-VE-14-02

TABLE OF CONTENTS

Page

INTRODUCTION ……. ……. 3

PROJECT DESCRIPTION ……. 3

RE-PROPOSED AND NEW VE RECOMMENDATIONS ……. 7

CONSIDERATION OF VE PROPOSALS FROM PREVIOUS WORKSHOP …… 8

APPENDIX A – Re-proposed and new VE recommendations ……. …… 11

APPENDIX B - Description of the Tentatively Selected Plan from *"West Shore Lake ……* 31

Pontchartrain Hurricane and Storm Damage Risk Reduction Study, Integrated Draft Feasibility Report and Environmental Impact Statement, August, 2013"

APPENDIX C - Description of Project Alternatives A,C and D from *"West Shore Lake……* 38

Pontchartrain Hurricane and Storm Damage Risk Reduction Study, Integrated Draft Feasibility Report and Environmental Impact Statement, August, 2013"

APPENDIX D – PROJECT FUNCTIONS AND CURRENT ISSUES …… 47

VALUE ENGINEERING REPORT

West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction

Feasibility Phase

(Update Supplement to VE Study CEMVN-00-10)

February 2014

CEMVN-VE-14-02

INTRODUCTION

This report documents Feasibility Phase Value Engineering (VE) application to this project. It serves as an update supplemental to a previous VE study (CEMVN-VE-00-10) that was performed in 2000, early in the planning phase. That study has exceeded its allowable 6-year viability per ER 11-1-321 and must be updated per this document.

In conducting this update, project functions, current issues as well as pertinent recommendations from the previous VE workshop were considered and documented below.

As a result of this review several original and new VE recommendations are presented as **Appendix A,** and should be further considered in further project development.

PROJECT DESCRIPTION

The proposed project provides flood risk reduction for a portion of the southwest Lake Pontchartrain Basin (see below project location map).

The Tentatively Selected Plan (TSP) levee and flood wall alignment starts form the east at the West Guide levee of the Bonnet Carré Spillway to the US-51 interchange, where it then tracks north across US-51 and along a pipeline transmission corridor. The approximately 18.27-mile alignment crosses I-10 and follows the pipeline corridor through wetlands near the Belle Terre exit until it reaches Hope Canal. The alignment then turns south and extends to the MRL (see below plan map). Elevation and/or acquisition of structures outside the alignment would reduce risk of storm surge-related damage to structures in areas west of the Hope Canal.

Construction of this plan will require 3,365,000 cubic yards of geotextile fabric; nearly 26,000 cubic yards aggregate limestone road; 5,300 linear feet of T-walls; 300 linear feet of

flood gates; 200 linear feet of drainage gates; 4 pump stations; and 2 railroad gates. Environmental structures (sluice gates) will be built at existing bayous/canals that intersect the proposed flood protection barrier.

Although mitigation planning was integrated into the overall plan formulation process, implementation of the TSP requires compensatory mitigation for unavoidable project-induced impacts that will require replacing or providing substitute resources. A mitigation plan for the TSP will be completed following the feasibility level design and analysis and will be included in the final feasibility report.

The current TSP cost estimate is as follows:

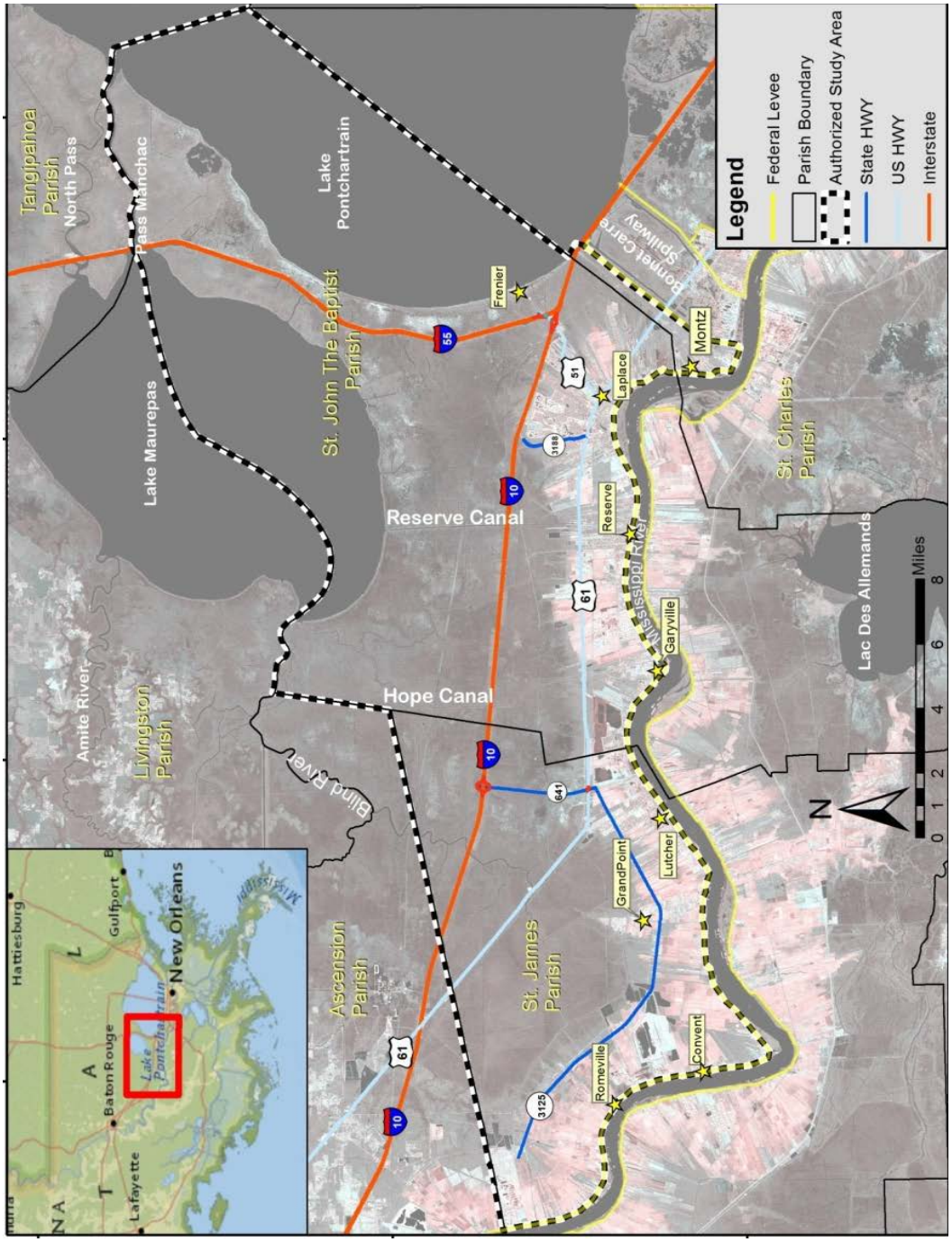
	Total	Federal	Non-Federal
PED	$7,500,000	$4,875,000	$2,625,000
Construction	$761,051,070	$557,500,446	$203,550,625
Pipeline Relocations	$35,100,000	-	$35,100,000
Lands, Easements, & ROW*	$84,700,000	$15,052,750	$69,647,250
Total First Costs**	**$888,351,070**	**$577,428,196**	**$310,922,875**

*** Federal costs are Administrative Cost of Non-Federal Sponsor Oversight**
**** Monitoring and Adaptive Management costs not included.**

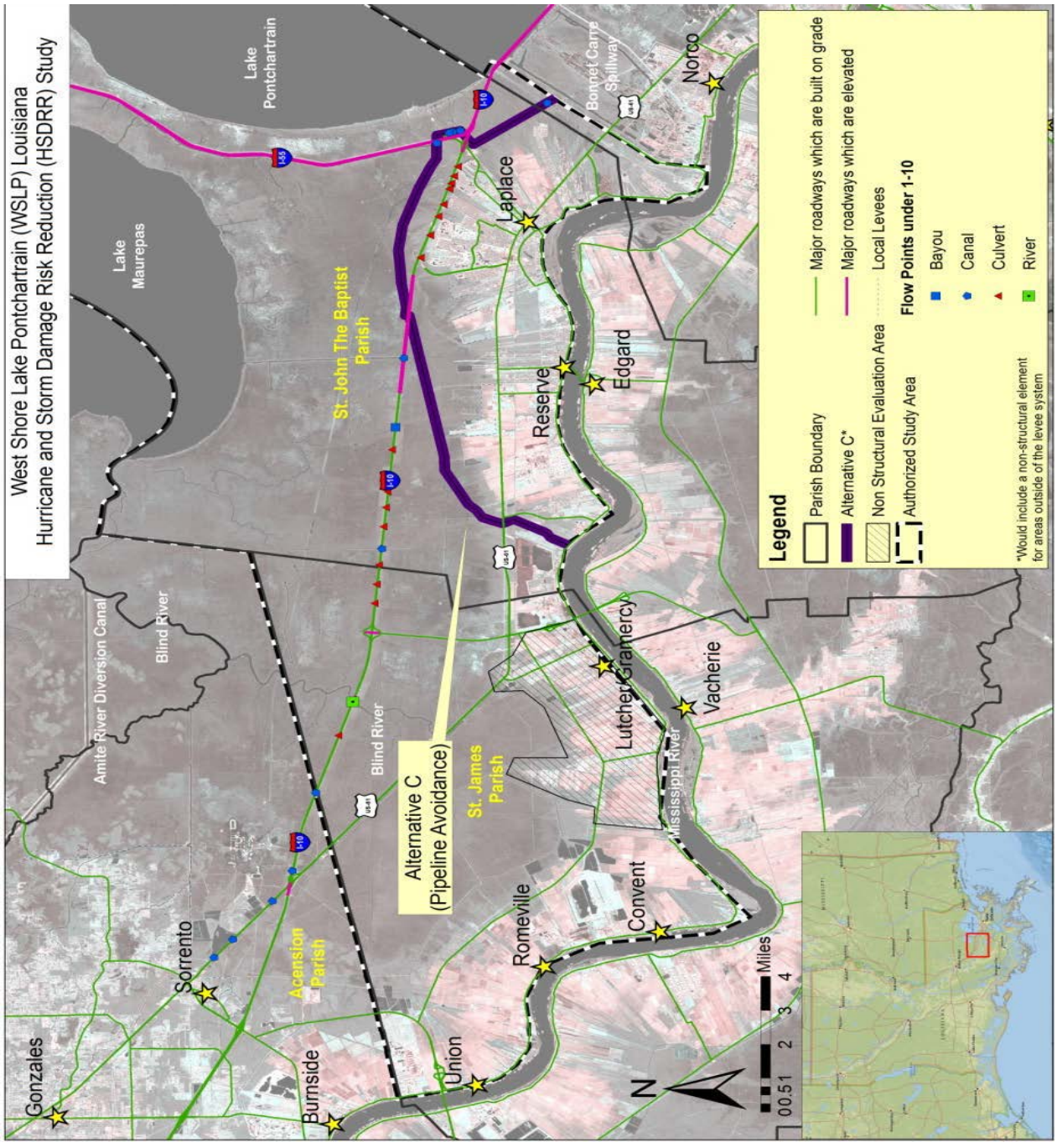
Future estimated annual operation, maintenance, rehabilitation and replacement costs for this plan are $520,000 for levee grass cutting and periodic repairs, plus $3,607,000 for pump stations and gate structures. Additional annual costs for environmental mitigation is also required and not included in the above.

Baseline information foe this VE update was obtained from the document, ***"West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study, Integrated Draft Feasibility Report and Environmental Impact Statement, August, 2013".*** Further information extracted from this document regarding the TSP and other project alternatives (A&D) can be respectively found in **Appendices B and C.**

(Project Location Map)



(Plan Map of TSP)



RE-PROPOSED AND NEW VE SUGGESTIONS

The list below contains suggestions carried forward from the previous VE study (see next section) or newly identified items addressing project functions and/or current issues (Ref. **Appendix D**. The following are presented/discussed in **Appendix A:**

Item 1 – *Consider non-implemented features of the Amite River Diversion Canal Modification Project for mitigation*

Item 2 – *Designate permanent conservation areas inside proposed levee alignment*

Item 3 – *Consider internal water flow in mitigation feature design*

Item 4 – *Re-consider alignment to incorporate additional NER benefits*

Item 5 – *Address options for I-55 crossing*

Item 6 – *Evaluate pump station capacity requirements; address consistency with other CoE projects*

Item 7 – *Consider optimized pump station design*

CONSIDERATION OF VE PROPOSALS FROM PREVIOUS WORKSHOP

The 'parent' VE study document for this update supplemental is ***"West Shore Lake Pontchartrain, Louisiana Hurricane Protection Project, Value Engineering Study, September 2000, CEMVN-00-10".*** The following is a list of recommendations and design comments contained in that report with current disposition as applied to the current plan. As noted, items were integrated into the current design, eliminated for reasons noted or remain viable and are 're-proposed' for further consideration:

Recommendation 3,4,16,17- ***Use a pumped drainage system.*** Eliminated due to environmental need to have inflow/outflow on a constant basis for the proposed gated waterways

Recommendation 18,43 - ***Consolidate drainage structures***. Integrated in current design.

Recommendation 11 - ***Use geotubes.*** Eliminated; geotube levee core determined not to be viable

Recommendation 29 – ***Incorporate reserve relief canal diversion guide levee.*** Eliminated; new expanded alignment selected.

Recommendation 12 – ***Compromise between Plans 1 & 3.*** Eliminated; new expanded alignment selected.

Recommendation 2- ***Eliminate Hwy. 51 protection.*** Eliminated; Hwy 51 and I-55 access determined to be a critical items.

Recommendation 6 – ***Construct north-south levee.*** Eliminated; open levee alignment would not be effective in long duration tidal event.

Recommendation 39 - ***Consider composite plan.*** Eliminated; new expanded alignment selected.

Design Comment (DC)-44 – ***Add interceptor canal.*** Integrated in current design.

DC-14 - ***Purchase environmental easements.*** Not defined in current plan; suggestion remains viable is carried forward. ***See Appendix A, Items 2 and 4.***

DC-21- ***Use "potato ridges" for wetland maintenance.*** Not defined in current plan; concept remains viable for consideration in potential mitigation feature design. Re-defined as, "Consider internal water flow in mitigation feature design". ***See Appendix A, Item 3***.

*DC-26 - **Use natural gas to fuel pump stations.*** Eliminated; natural gas supply interrupted in are during Hurricane Katrina and is now not considered a reliable fuel source.

*DC-I 0 – **Consider future development for pump station design capacities.*** There may be some issues with pump station capacity requirements; topic is carried forward. ***See Appendix A, Item 6.***

*DC-15 - **Incorporate a floodplain management plan.*** The PDT will address EO-11-988 "use of Floodplain" guidance.

*DC-7 -**Reconcile FEMA and corps flood data.*** New H&H modeling has been performed and calibrated with recent major storm event data (Hurricane Isaac).

*DC-9 –**Design for hurricane protection only.*** Eliminated; new expanded alignment determined to be cost-effective versus alignment bordering development (Alt. A).

*DC-5 -**Reduce levee heights (westward).*** **Implemented; (see ED Appendix; cost avoidance savings to be determined)**

*DC-24-**Design for larger hurricane event.*** Preliminary design is based on 0.01 probability event level of protection. This is in accordance with current regional design protection and appears to be slightly higher than the previous Cat. 3 model hurricane event. Future optimization may also be performed (recommendation partially implemented).

*DC-30-**Increase levee crown width to 10 feet.*** Implemented.

*DC-8 - **Revisit Airline Highway tie-in.*** Eliminated; new expanded alignment selected.

*DC-41,42-**Check I-55 crossing.*** Initial system elevation (2020) will not impact I-55 bridge; future 2070 will and there is no current design plan. Recommendation is carried forward. ***See Appendix A, Item 5.***

*DC-22 – **Revisit borrow material availability.*** New alignment assumes available/suitable borrow along protected reach of levee.

*DC-45 - **Revisit O&M requirements and costs.*** Implemented.

*DC –6–**Consider effects of Illinois Central Gulf Railroad (IGC).*** Model has incorporated this feature; railroad ballast embankment not suitable as a levee structure.

DC-1 - Consider levee location south of I-10 along Belle Terre reach. Eliminated; new expanded alignment selected.

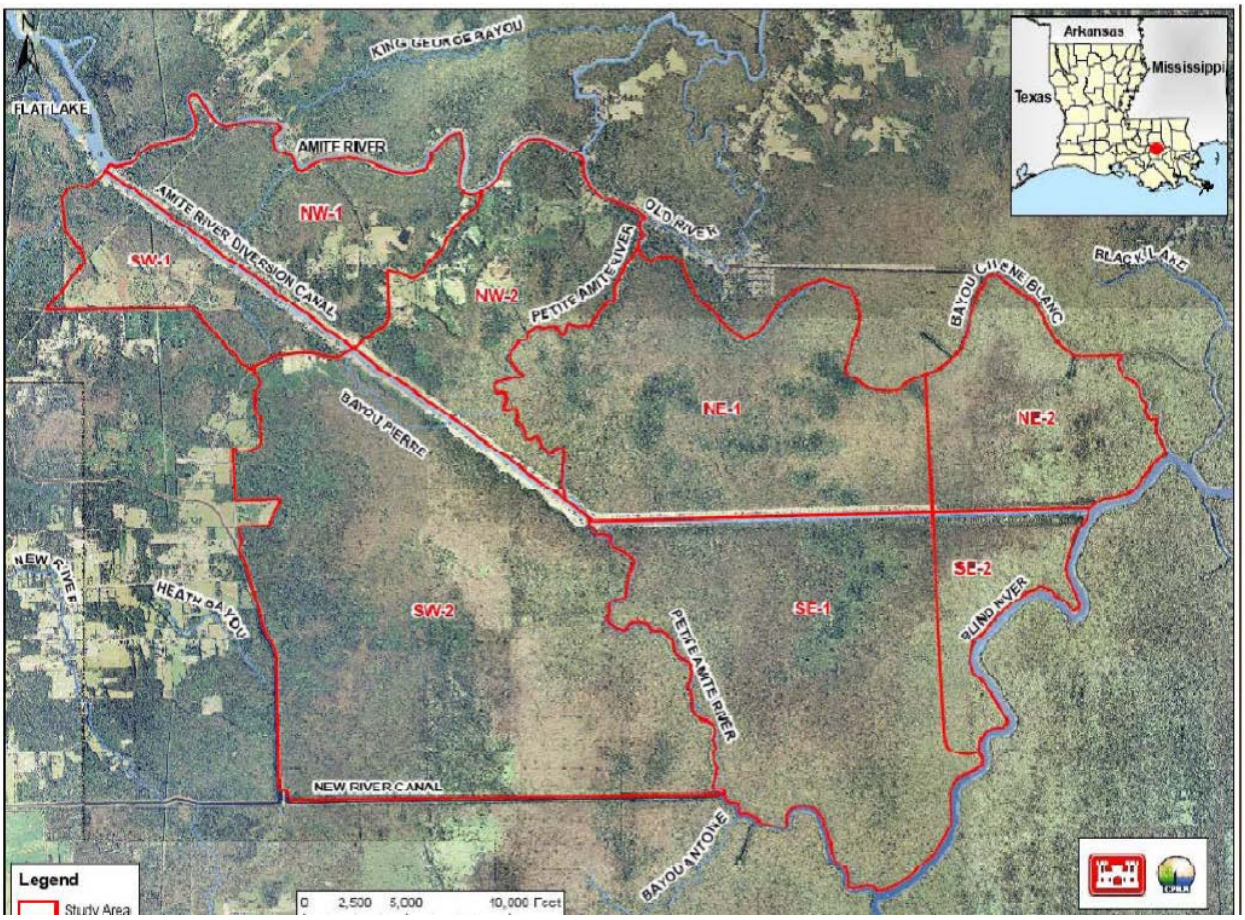
DC-35- Consider I-wall along 1-10 (Belle Terre reach). New alignment has ample right-of-way for less expensive earthen levee.

DC-38 – Consider floodgate on MRGO near Paris Road. Implemented for other HSDRRS project.

APPENDIX A

Re-Proposed and New Value Engineering Recommendations

Item 1 – Consider non-implemented features of the Amite River Diversion Canal Modification Project for mitigation - A recent change in the LCA program indicates that the State no longer supports the lower basin project features of the item subject project (see below map). The potential benefit areas of these features are in close proximity to Westshore and could potentially be targeted as mitigation for the project and likely be far less costly than other measures. Amite River Diversion Canal Modification project features are described below.



AMITE RIVER DIVERSION CANAL MODIFICATION PROJECT AREA MAP

Alternative Measures In Subunit NE-2

The measures currently being considered for Subunit NE-2 include the following:

Bank opening, north bank of Blind River, Location 1 (proposed by site reconnaissance team)

Channel dredging, pull boat trace, Location 2 (proposed by site reconnaissance team)

Bank opening, north bank of Amite River Diversion Canal, Location 3 (proposed as component of Measure BO14)

Bank opening, north bank of Amite River Diversion Canal, Location 5 (proposed by site reconnaissance team)

Bank opening, north bank of Amite River Diversion Canal, Location 6 (proposed as component of Measure BO14)

Two openings in railroad grade north of Amite River Diversion Canal, strategically located (proposed as component of Measure BO23)

Vegetative planting in degraded areas

Alternative Measures In Subunit SE-2

The measures currently being considered for Subunit NE-2 include the following:

Bank opening, south bank of Amite River Diversion Canal, Location 4 (proposed as component of Measure BO15)

Channel dredging and/or clearing and snagging of Blind River tributaries, north bank of Blind River (proposed by site reconnaissance team)

Two openings in railroad grade south of Amite River Diversion Canal, strategically located (proposed as component of Measure BO24)

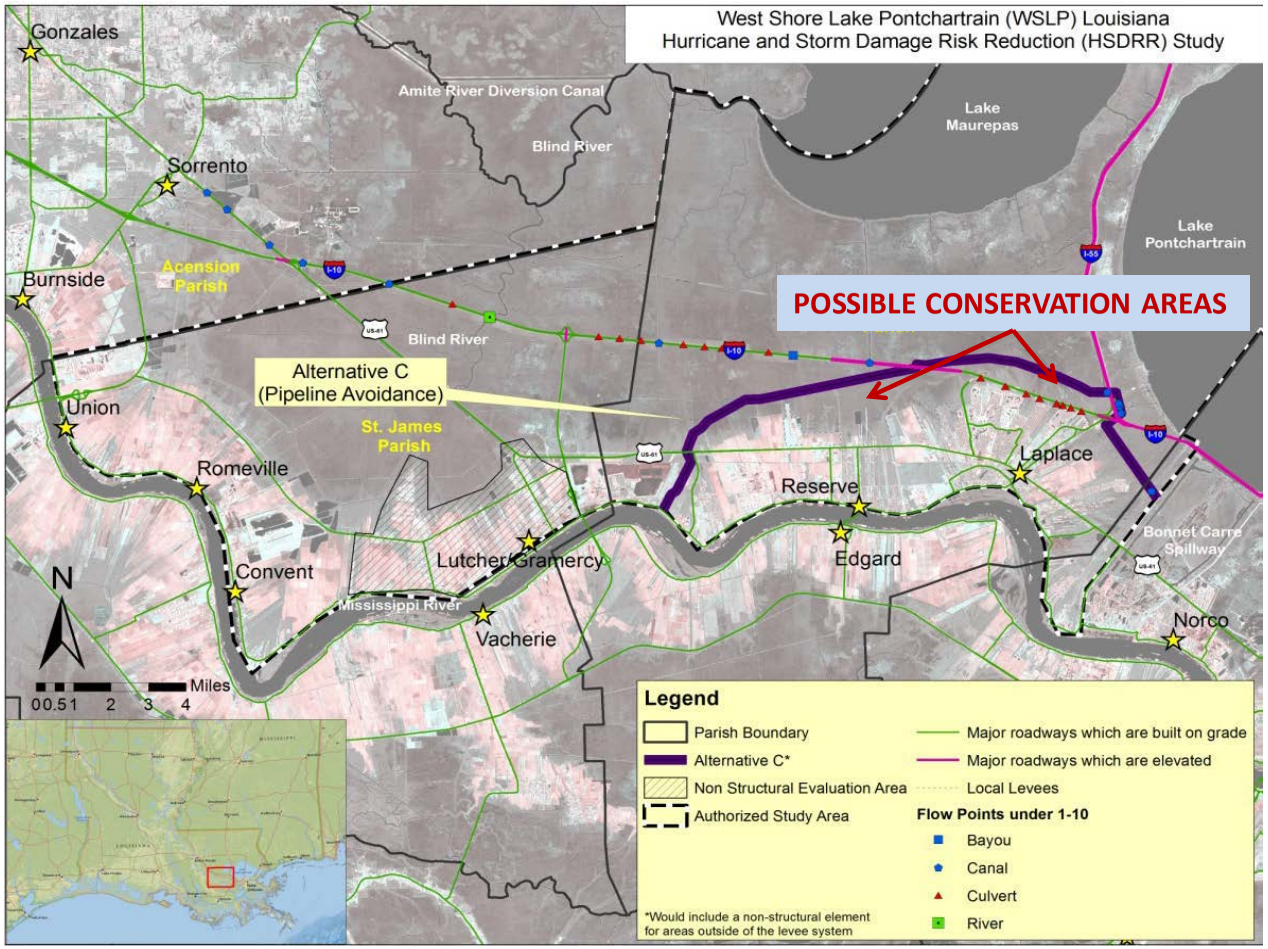
Vegetative planting in degraded areas.

Openings in Railroad Grade, Strategically Located (Subunits NE-1/NE-2 and SE-1/SE-2)

In addition, locations for openings in the relic railroad grade north and south of the Amite River Diversion Canal were determined through LiDAR analysis. Two locations were determined to exhibit characteristics that would constitute ideal locations for establishing hydrologic connectivity between Subunits NE-1 and NE-2. These locations were selected because they occupy topographic low points between vegetated hummocks and/or channel banks.

Item 2 – Designate permanent conservation areas inside proposed levee alignment -

There appears to be the potential to reserve some of the areas that will be enclosed by the project. While the purchase of environmental easements may, or may not, necessary, assuming future development of all enclosed and mitigating for same does not appear prudent since wetland development permits would not be granted. Two such possible areas are suggested and shown on the map below (additional areas should also be investigated). Water flow through drainage gates should be adequate to maintain hydrologic conditions. Also, there is the potential for future trails and other appropriate interaction features. Designating these reserve areas reduces indirect mitigation cost.


West Shore Lake Pontchartrain (WSLP) Louisiana
Hurricane and Storm Damage Risk Reduction (HSDRR) Study
Gonzales
Amite River Diversion Canal
Blind River
Lake Maurepas
Lake Pontchartrain
Sorrento
Ascension Parish
Burnside
POSSIBLE CONSERVATION AREAS
Blind River
Alternative C (Pipeline Avoidance)
Union
St. James Parish
Romeville
Laplace
Reserve
Bonnet Carre Spillway
Edgard
Lutcher/Gramercy
Convent
Mississippi River
Vacherie
Norco
N
Miles
00.51 2 3 4
Legend
Parish Boundary
Alternative C*
Non Structural Evaluation Area
Authorized Study Area
Major roadways which are built on grade
Major roadways which are elevated
Local Levees
Flow Points under 1-10
Bayou
Canal
Culvert
River
*Would include a non-structural element for areas outside of the levee system

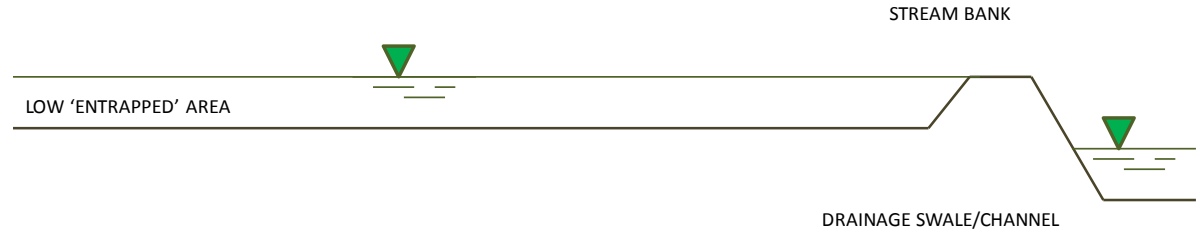
Item 3 – Consider internal water flow in mitigation feature design – Project mitigation areas will likely be located in area with hydrologic inflow and outflow. Investigation of existing local cypress swamps indicates the possibility of degradation due to flow entrapment. This is particularly evident in areas subject to tropical storm tidal flow events. It is therefore recommended that internal water flow modifications be considered for proposed mitigation areas. Such features mostly consist of berm excavation to connect apparent entrapment areas to drainage outlets as further described and depicted in schematics below.

(Description of Alternative Concept) Obtain further refined LiDAR and other data to identify 'trapped' low areas and/or possible unwanted collection points of freshwater diversion flow. Connect low areas to natural drainage outlets via strategically placed cuts in natural or man-made berms (such as canal spoil banks

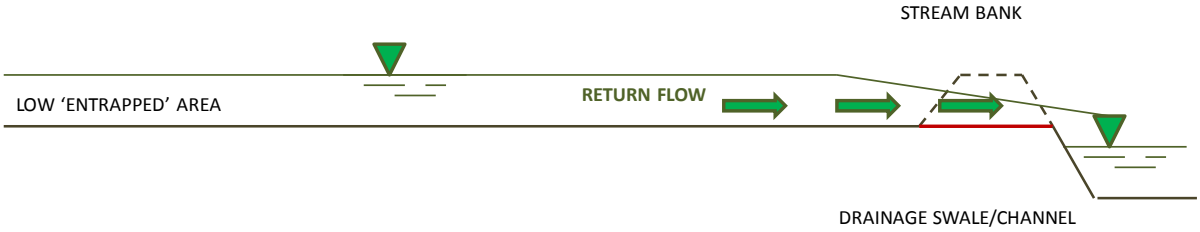
INITIAL NORMAL FLOW CONDITION

TIDAL SURGE FLOOD CONDITION

EXISTING CONDITIONS – POSSIBLE WATER ENTRAPMENT
(SCHEMATIC SECTION – NO SCALE)



POST TIDAL SURGE FLOOD CONDITION



POST TIDAL SURGE FLOOD CONDITION – **WITH PROPOSED BANK CUT**

PROPOSED BANK CUT

(SCHEMATIC SECTION – NO SCALE)

Item 4 – Re-consider alignment to incorporate additional NER benefits - The current philosophy and assumptions regarding levee placement and environmental impacts of this project appear to be as follows:

- Restricting open tidal flow, particularly sheet-flow, has negative impacts.
- It is assumed that all areas inside the levee system will be developed and eliminate habitat (indirect environmental impact).
- A key early assumption was that an adjacent proposed project – *'Convent/Blind River Diversion'* would have positive effects on major cypress swamps from the Mississippi River northward beyond US Highway 61 (US61). See below map.

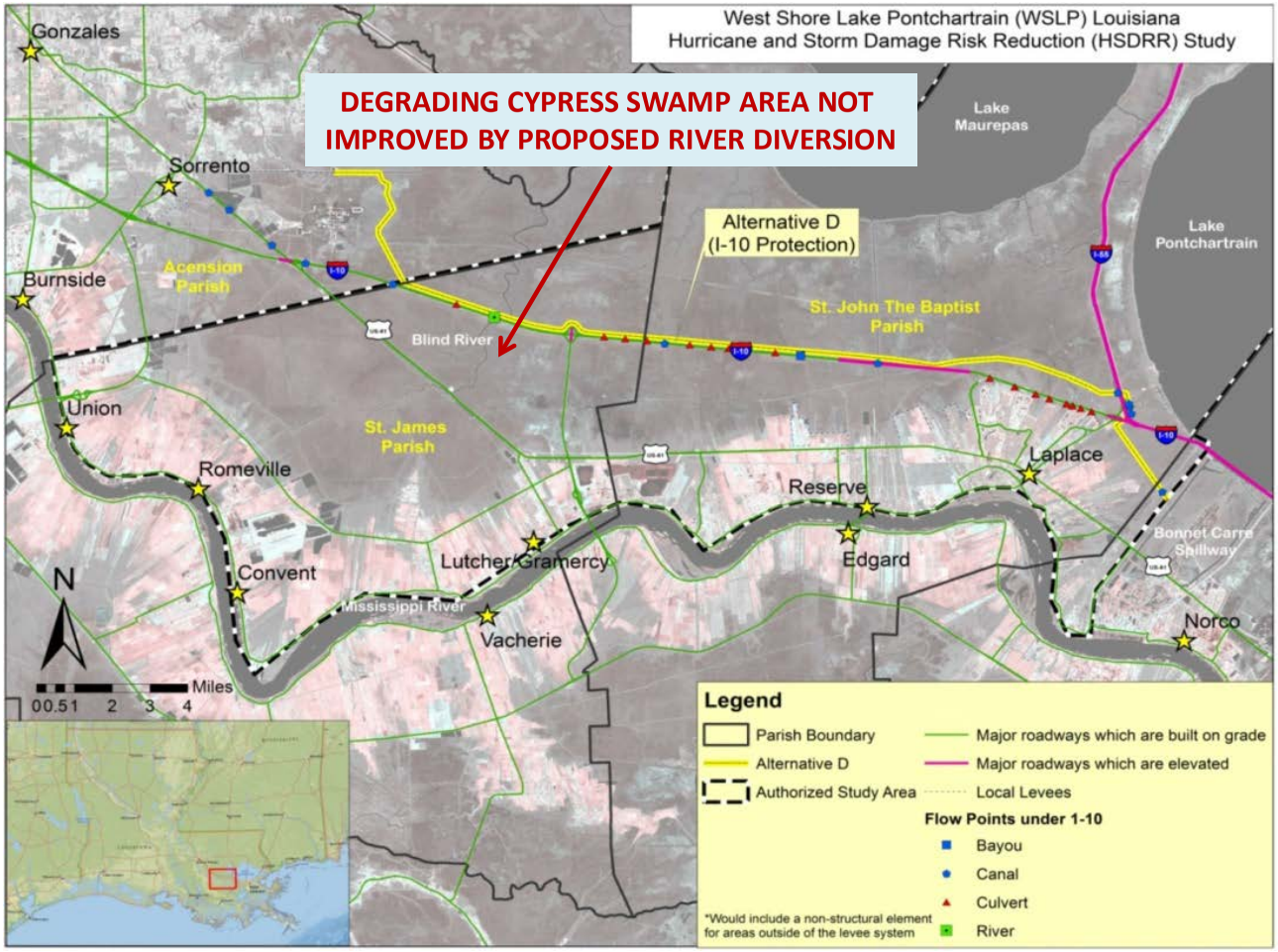
It is suggested that these above presumptions be re-visited with the following considerations:

- The current project design calls for gated drainage structures that will allow control of inflow and outflow to the interior; this 'leaky levee' concept is being embraced for the Morganza to the Gulf and other projects as environmentally sound. The control of saltwater intrusion, particularly when sea level rise is considered, may be a critical ***positive*** factor in maintaining area cypress swamps.

- It is possible to restrict development inside the levee system either by designating select areas as environmental reserves. This can be accomplished via purchase of an environmental easement (as required by CoE policy), by local ordinance or by simple designation since it appears very remote that a federal permit would ever be granted to develop these areas. While outright easement purchase may ***(or may not)*** be more expensive than mitigation, a waiver of CoE policy could be considered.

- Recent hydraulic analysis indicated the proposed Convent/Blind River Diversion Project will not have benefit to the part of the target area – that north of US61. As such, there is currently no proposed plan for protection of this significant cypress swamp area. Its primary degradation, apparently due in large part to saltwater intrusion and entrapment could be retarded with flow control such as a gated levee system could offer.

Given these reconsiderations, it may be determined that a westward extension of the proposed levee (similar to previous Alternative D) may actually produce net environmental benefits (NER) or at least not have nearly the negative impacts (and associated mitigation cost) as previously estimated. Without such an extension, continued loss of a vast area of significant cypress swamp will continue to degrade at its current rate of loss.


West Shore Lake Pontchartrain (WSLP) Louisiana
Hurricane and Storm Damage Risk Reduction (HSDRR) Study
DEGRADING CYPRESS SWAMP AREA NOT IMPROVED BY PROPOSED RIVER DIVERSION
Alternative D
(I-10 Protection)
Gonzales
Sorrento
Burnside
Ascension Parish
Blind River
Lake Maurepas
Lake Pontchartrain
St. John The Baptist Parish
Union
St. James Parish
Romeville
Convent
Lutcher
Gramercy
Mississippi River
Vacherie
Reserve
Laplace
Edgard
Bonnet Carre Spillway
Norco
N
Miles
0 0.5 1 2 3 4
Legend
Parish Boundary
Alternative D
Authorized Study Area
Major roadways which are built on grade
Major roadways which are elevated
Local Levees
Flow Points under 1-10
Bayou
Canal
Culvert
River
*Would include a non-structural element for areas outside of the levee system

Item 5 – Address options for I-55 crossing – Current levee/floodwall design indicates that elevated I-55 is higher than the required 2020 flood height but not the 2070. In lieu if raising the bridge a wave-break structure could be placed just northwest and northeast of the bridge/levee intersection. This would reduce wave run-up and may allow levee/floodwall height reduction such that it passes under the bridge structure. Another option that can be implemented either independently of supplemental to a wave-break structure would be to design the low section of levee/floodwall as an actual weir. Conveyance to an acceptable drainage point cold be improved via concrete paved swales or small canals such that short period overtopping flow can be safely handled.

Item 6 – Evaluate pump station capacity requirements; address consistency with other CoE projects – Further design of proposed pump stations should carefully consider proper conveyance capacity and unit redundancy. Recent hurricane risk reduction projects have been constructed in areas already under pumped stormwater systems; replacement or maintenance of pump stations adhered to existing drainage capacity and system requirements. This project is different in that proposed pumps will replace an existing gravity system and should convey flow greater than or equal to current *under all conditions*.

MVN projects where conversion to pumped drainage has been implemented usually select an apparent 'reasonable' design flow event, such as a 0.04 annual probability. This practice is not uniformly used in other districts as Jacksonville (SAJ) uses 0.01 or greater for conversion systems in their Everglades Restoration Projects. Regardless of the above, an assessment of existing gravity drainage conveyance should be performed and matched or exceeded.

Conveyance design should be adequate under all conditions; existing gravity design should be calculated under low tide conditions (yields current maximum drainage capacity that should be maintained or exceeded). Also, proposed pumping plants should convey this flowrate under maximum design tidal conditions. In short, a design rainfall can be expected in conjunction with a major tropical storm (note that they are NOT statistically independent events).

Proper unit redundancy should also be considered. Local practice does not require an additional pump unit to meet maximum design capacity with one (largest) unit (including ancillary items such as screens, etc.) out of operation. This is not the case for SAJ/South Florida Water Management District where unit redundancy is included in their design. Consideration to unit redundancy should be applied to pump station design in this project.

It may be possible to combine unit redundancy with adjacent pump stations given that most (all) will be hydraulically connected via a manifold canal (borrow pit canal). As such, a single additional unit may be adequate at the middle pump station plus maybe one or two other stations.

Item 7 – Consider optimized pump station design - A number of new pump stations are proposed for this project. Preliminary design indicates 'traditional 'type facilities for this range of station capacity (see below preliminary design sketch). Major features include, but are not limited to the following:

- vertical pumps with direct diesel drive
- siphonic discharge
- climber intake screen cleaning mechanism
- closed interior station with a operator 'safehouse' contained in the station building
- internal permanent lifting crane

In addition to considerations of proper station capacity and unit redundancy discussed in the above recommendation, 'lessons learned' from recent District, other Corps and local projects offer a number of possible options that could significantly improve design cost-effectiveness. Items that should be fully evaluated are:

(Pump type)

Vertical pumps are generally cost-effective in most drainage applications. However, for stations in the capacity ranges designated in this project, other options are possible and may indirectly allow changes in total station configuration that could save significant cost. One option is electric submersible units powered by separate generators. Use of this type of pump offers much flexibility in the overall station structural design and can easily be automated (see comments below). This type of station has been recently constructed at Oakdale (see below photo) and is under consideration for permanent pumps at the Harvey Canal Sector Gates – 770 CFS (see design sketches below).

(Discharge configuration)

Given that these stations will not operate many hours power supply and energy savings afforded by lower operating head achieved via siphonic discharge do not warrant the cost of the discharge tubes. **It is important to note that these pumps must perform under near zero head conditions (gates closed tidal surge not yet arrived) as well as full flood elevation water levels.** As such, this would likely result in the need for induced head under normal tide levels via a 'saxophone' type (end turned upwards) discharge tube. This further increases the cost of the discharge tubes as well as reduces some of the desired power/energy recovery. Over top of wall open discharge requires a slight increase in driver power and very small added energy use but greatly simplifies the pumping system and first cost. This design concept has been successfully used for the East Ascension, Oakville and West Closure Complex pump stations.

(Screen cleaning mechanism)

Current local standards call for intake screen cleaning units to be fully operable under hurricane (wind conditions >120 mph) conditions. There appears to be very limited available units that can meet this requirement and is almost a sole-source condition. Units are very expensive relative to those that cannot achieve this criterion. Others in hurricane areas do not adhere to this standard and offer that it may not be practical or safe given that screen cleaning operation in very high wind conditions would either result in debris blowing right back into the intake or launched into the station structure. To address possible screen clogging during hurricane events, separated screen bridges are designed slightly wider. The possibility of Individual pump screens clogging is addressed in overall unit redundancy per discussed above. Cleaning mechanisms should, however, be designed to release debris away from the screen such that front-loader removal is not necessary to after the storm event.

(Equipment and operator housing structure)

Current local preference is to completely house all equipment and operation control in one large building. Post Katrina criteria also require an operator 'safehouse' capable of withstanding extreme hurricane conditions. Regardless of station size such a large containment structure is not necessary. Pump drivers and ancillary equipment can be protected via 'shell' covers with an independent qualified safehouse control room. Lifting crane(s) can either be brought in as needed or by external on an open frame or gantry track (see item below). A good example of such station configuration is the East Ascension Parish Pump Station. While the control room was not built to safehouse standards, the rest of the station utilizes such a shell cover concept (see below photo). *Also note that his station includes gravity gates integrated in the pump station structure (between each pump).*

(Lifting crane)

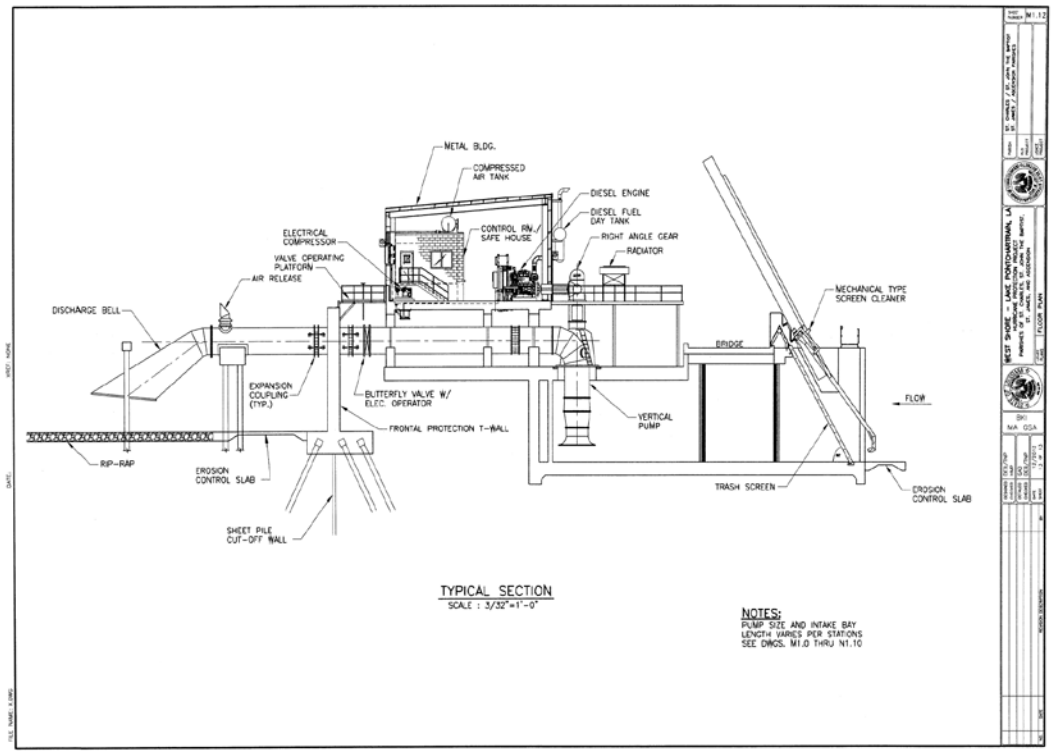
Current local preference is to have a crane, capable of lifting the largest piece of equipment, permanently installed inside the single station building. This requires that the building have excessive height (and cost) to both house and support the crane. Since lifting a pump must be a planned event, it is possible to bring in a locally owned or rented crane for each event. A more favorable option is to have an external crane on a frame and/or gantry track in conjunction with a removable cover shell or low-rise building (roof panel).

(Auto-operation of some stations)

Safehouses may be expensive, particularly if elevated above levee breach event water level. Also, manning each pump station in an event is not desired if a reliable alternative exists. It is proposed that perhaps only one or two stations be manned and have SCADA monitoring of the

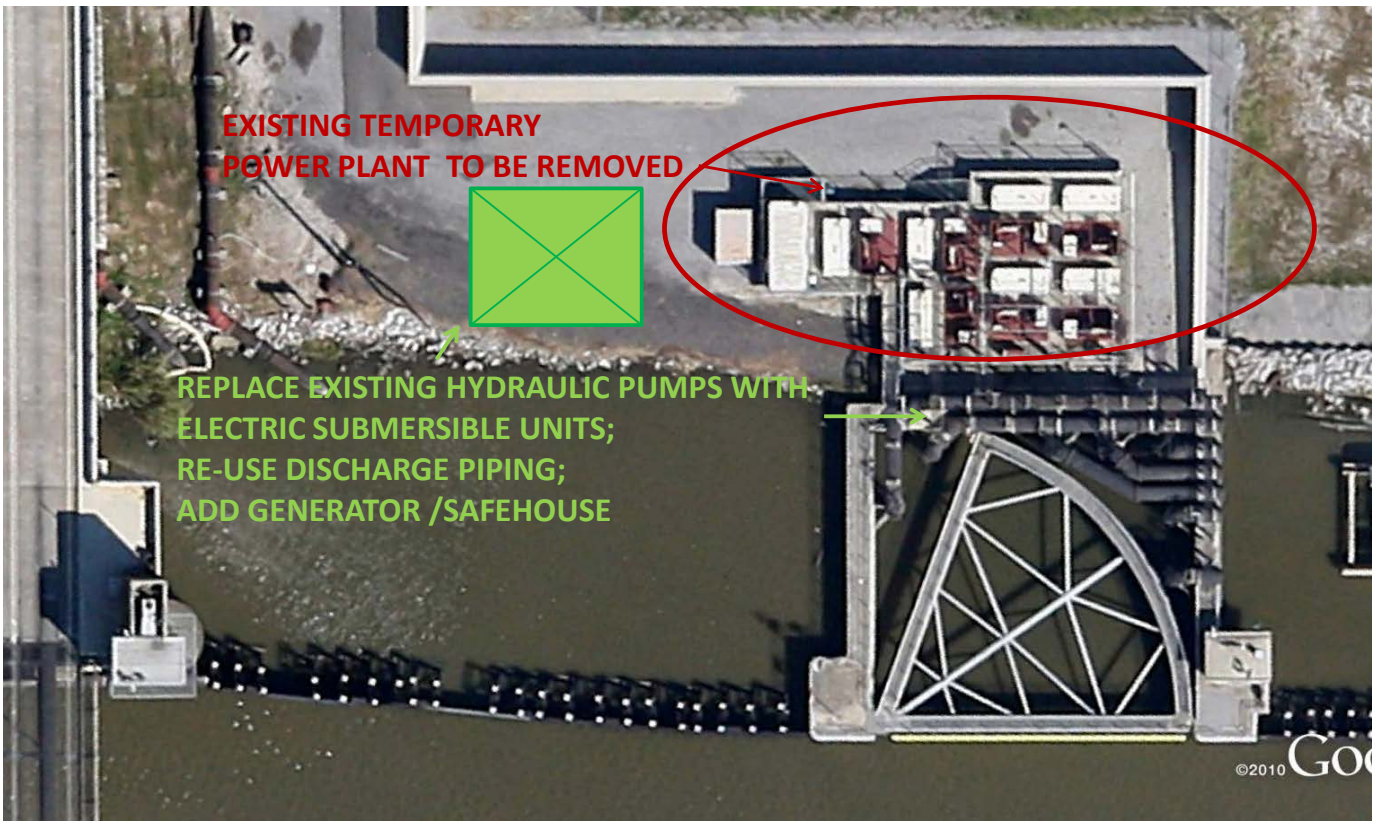
other facilities. The un-manned stations could be auto-control by a fairly simple and reliable float switch system. This becomes a more viable option in conjunction with alternative pump type and discharge options discussed above.

All of the above considerations may be integrated into a comprehensive cost-effective design. It is recommended that the above mentioned local pump stations utilizing these alternative concepts as well as other stations with similar function such as Jacksonville District / South Florida Water Management District.

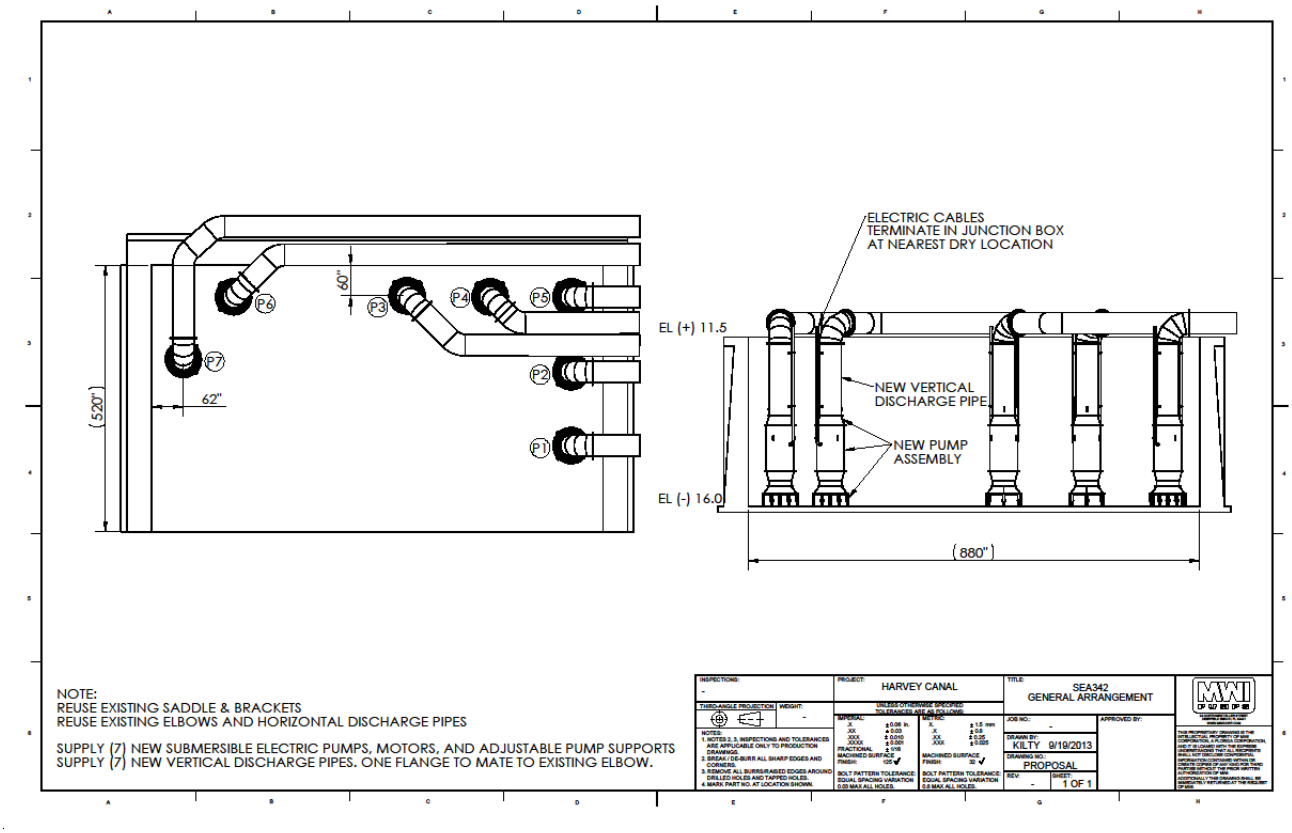


TRADITIONAL PUMP STATION

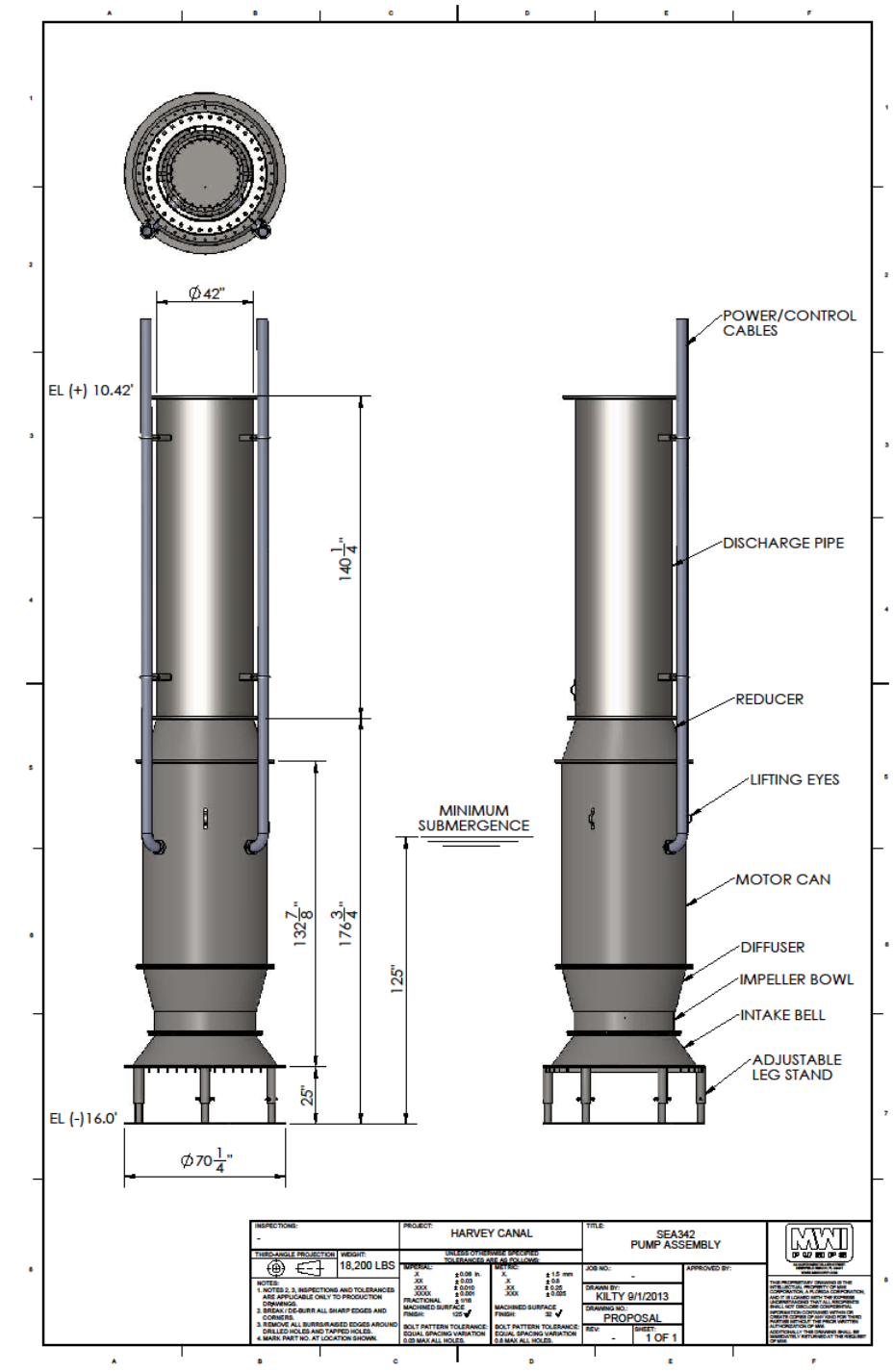
OAKVILLE PUMP STATION - ELECTRIC SUBMERSIBLE PUMPS WITH GENERATOR BUILDING



HARVEY CANAL SECTOR GATE - PROPOSED PUMP REPLACEMENT PLAN (ELECTRIC SUBMERSIBLES WITH GENERATOR BUILDING)



HARVEY CANAL SECTOR GATE - PROPOSED PUMP REPLACEMENT PLAN (ELECTRIC SUBMERSIBLES WITH GENERATOR BUILDING)



ELECTRIC SUBMERSIBLE PUMP

EAST ASCENSION PARISH PUMP STATION – 1,000 CFS PUMP UNITS

WITH DRAINAGE GATES BETWEEN PUMP UNITS

APPENDIX B

Description of the Tentatively Selected Plan from *"West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study, Integrated Draft Feasibility Report and Environmental Impact Statement, August, 2013"*

5.0 TENTATIVELY SELECTED PLAN (*NEPA Required)

Alternative C is the Tentatively Selected Plan (TSP). Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final Report.

5.1 Description of the Tentatively Plan

The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-4. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of EO 12898.

The structural component of the system would consist of earthen levees, floodwalls (T-walls), floodgates, drainage structures and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay (borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of -10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I-55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year.

The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis.

The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

5.1.1 Real Estate Requirements

A Real Estate Plan (REP) describing the real estate requirements and costs for the project can be found in Appendix C. The REP was prepared with estimated right-of-way (ROW) requirements based on available information. The REP and real estate cost estimates will be revised during feasibility-level design and analysis.

The estimated cost of real estate acquisition for structural features is $3,283,000. The alignment follows State-owned land and the property of approximately 120 owners. A standard perpetual levee easement for approximately 856 acres will be acquired for the construction of levees and floodwalls. A non-standard perpetual underground piling easement will also be acquired for all floodwalls. A standard Drainage Ditch Easement would be acquired for the areas needed for the conveyance canal. Borrow material for this project would come from the Bonnet Carré Spillway which is owned in fee by the Federal Government or from alternative sources not yet identified. A standard temporary work area easement will be acquired for staging areas. Mitigation land will be acquired in fee, excluding rights to minerals (with restrictions on use of surface). A non-material deviation will be made to the standard road easement to revise the rights necessary for a temporary non-exclusive road access (Appendix C).

The estimated cost of real estate acquisition for the non-structural feature is $81,417,000. Approximately 1,571 landowners may be impacted by this feature. The feature entails property acquisitions and structure raisings. At this time there has not been sufficient evaluation to determine particular structures to be included in the feature. A detailed evaluation of the work entailed in structure raising will be accomplished during the feasibility level design and analysis. At that time, the appropriate real estate interests to be acquired for non-structural measures will be determined, and the real estate costs will be refined. Displaced persons and businesses may be entitled to Public Law 91-646, Title II Relocations Assistance.

The total estimated cost of real estate for the project is $84,700,000. The CPRAB will have the responsibility of acquiring all necessary real estate interests for the project.

5.1.2 Relocation Assistance

Levee construction may cause relocations and/or temporary interruptions to pipelines. The existing carrier line would remain in operation while a bypass line would be constructed through a sleeve in the T-wall cutoff piles. When a bypass is complete and in place, the tie-in with the existing line would follow. Potential cost of this work is presented in Table 5-1. Detailed information will be developed during feasibility-level design and analysis.

Table 5-1: Unit cost of pipeline relocations.

Description	Estimated Quantity	Cost
≤6" Diameter	14	$515,000 each
>6" to ≤12" Diameter	16	$700,000 each
>18" to ≤24" Diameter	5	$1,550,000 each
> 24" Diameter	1	$1,920,000 each

5.1.3 Operation and Maintenance, Repair, Rehabilitation and Replacement

The purpose of operation and maintenance, repair, rehabilitation and replacement (OMRR&R) is to sustain the constructed project. The estimated annual OMRR&R cost is $4,128,075 (Table 3-4). This estimate will be further refined during feasibility-level design and analysis. After the

District Engineer provides notice of construction completion for the project, or functional portion of the project, the CPRAB will commence OMRR&R responsibilities associated with the project.

5.1.4 Benefit Analysis

Project Benefits

Models were run to determine the effects of storms on area resources. Hydrologic modeling results were developed to help establish the existing and future conditions and determine potential measures needed to address surge and storm-related damages. A database of values, types, and first floor elevations was developed for all structures in the area. This information was compared to the surge modeling to determine storm damages. Maps showing inundation of structures that could be damaged under FWP conditions will be developed.

Mitigation Plan Benefits

Habitat value analysis will be completed during feasibility-level design and analysis. Ecological model results will be combined with cost data to develop mitigation plans.

5.1.5 Risk & Uncertainty Analysis

Risk and uncertainty are intrinsic in water resources planning and design. This section describes various categories of risk and uncertainty pertinent to the study. Risk and uncertainty will be further considered during feasibility-level design and analysis.

5.1.5.1 Environmental Factors

Relative Sea Level Rise*:* There is uncertainty about how much sea level change (SLC) would occur in the region. Higher than estimated RSLR could cause salt water intrusion into the freshwater swamp causing significant changes to this habitat.

An assessment of RSLR was included in plan formulation and alternatives analysis. The evaluation of RSLR is documented in Appendix B and will be refined during feasibility level design and analysis. Calculations based on EC 1165-2-212 determined that the low, intermediate and high rates of RSLR at 2070 are 1.81 feet per year, 2.32 feet per year, and 3.95 feet per year, respectively (Table 2-2). The intermediate RSLR rate was applied.

RSLR could impact the benefits achieved by the TSP. Because the project was developed using the intermediate RSLR rate, the TSP would provide more benefits than anticipated should the low RSLR rate result and less benefits with the high RSLR rate. The non-structural component would be less effective because structures would have to be raised to a height that would increase their risk from wind damage during a storm.

Storms: Risks associated with the TSP are primarily related to the possibility of extreme weather events. The uncertainty of the size or frequency of storms and meteorological events, such as El Nino and La Nina, cannot be predicted over a set period of time. The storm record is constantly being updated and a large storm such as Hurricane Katrina or a slow moving storm such as Isaac can alter the expected return period for other storms. To reduce the uncertainties of storm events, storms with varying degrees of size, intensity, and path are included in the modeling. By using a long-term record of different storm scenarios, the effects of such storms are incorporated into the modeling. The team is then able to reduce the uncertainty in the determination of project benefits (Appendix B).

5.1.5.2 Engineering Factors

Levee/Structure Failure: The risk associated with the levee/structure system is its stability. Analysis of the earthen levee and associated T-walls and gates will be evaluated during feasibility-level design and analysis, and included in Appendix B. The levee and other features will be constructed to meet USACE standards.

Hydrologic Flows: There is uncertainty as to whether the levee system would potentially induce flooding internally and externally to the levee alignment. Modeling results will be analyzed during feasibility level design and included in the final report. Hydrologic modeling (ADCIRC and STWAVE) will show if the TSP could potentially induce flooding in these area and allow for more accurate engineering and design of the levee system. The project will incorporate features to mitigate for any potential induced flooding.

The risk of running the ADCIRC and STWAVE models is the assumption that the models appear to provide a specific response on the TSP in any given scenario; however it is only a representative point of reference in a complex system. While the analysis is enhanced by the models, application of the models can introduce error and uncertainty. Calibration and verification efforts are employed so that the models more closely replicate observed changes or at least provide insight into the limitations of the model.

Models are limited by basic, underlying assumptions and uncertainties. Some of the simplifying assumptions include the model parameters. A sensitivity discussion will be completed during feasibility-level design and analysis and included in Appendix B of the final report. Another uncertainty is that a limited number of storm scenarios are modeled. It is assumed that various storm scenarios over a number of years will represent a much higher indicator of the levees ability to withstand major storm events.

The models also use available historic data to extrapolate future storm conditions and frequency. The size and frequency of storms included in the model are based on statistical analysis but do not account for meteorological changes, such El Nino and La Nina effects, that can increase or decrease storms over a period of several years. Neither do the models account for the potential of increased storms due to climate change.

5.1.5.3 Economic Factors

The risk for economics is in under or overestimating the future benefits associated with the project alternatives. The with-project damages and overall benefits associated with the alternatives were estimated based on the existing and future without-project damages. This could potentially result in the TSP not being economically justified or preliminary estimates of the benefit cost ratios being overstated. A full economic analysis will be conducted during feasibly level design and documented in the final report. Additional uncertainty surrounding variables such as population growth, first floor elevations, structure value, depth damage relationships and additional inputs are consistent with typically accepted project uncertainty.

The Hydrologic Engineering Center Flood Damage Analysis (HEC-FDA) Version 1.2.5a certified model was used to calculate the damages for the without project existing and future conditions. Economic and engineering inputs were necessary for the model to calculate damages for existing conditions (2012), the project base year (2020) and the final year in the period of analysis (2070). The inputs included structure inventory, future development, contents-to-structure value ratios, vehicles, first floor elevations and depth-damage relationships, ground elevations and without-project stage probability relationships.

The uncertainty surrounding each of the economic and engineering variables was entered into the model. Either a normal probability distribution, with a mean value and a standard deviation, or a triangular probability distribution, with a most likely, a maximum and a minimum value, was entered into the model to quantify the uncertainty associated with the key economic variables. A normal probability distribution was entered into the model to quantify the uncertainty surrounding the ground elevations. The number of years that stages were recorded at a given gage was entered for each study area reach to quantify the hydrologic uncertainty or error surrounding the stage-probability relationships.

5.1.5.4 Implementation Factors

Non-structural costs were based on a 100% structural survey of area improvements. Structures located in the 2020 and 2070 100-year floodplains were evaluated by comparing the cost of elevating the structure to the cost of acquiring the structure. The greater cost was used to determine an estimate of the cost of the non-structural feature. Relative sea level rise greatly impacts the number of structures to be raised, resulting in uncertainty as to how many structures would have to be raised. A minimum cost of the non-structural feature of $53,143,789 was developed based on the cost of reducing risk to structures in the 2020 100-year floodplain. A maximum cost of $305,256,794 was developed based on the cost of reducing risk to structures in the 2070 100-year floodplain. During feasibility level of design, the non-structural feature will be further evaluated by economic reach. The resulting evaluation may reduce the number of structures that would be included in the non-structural feature.

5.2 Implementation Requirements

5.2.1 Preconstruction Engineering and Design

Detailed design of the WSLP Project will be shared between CPRAB and the USACE. All detailed design will be in accordance with USACE's regulations and standards.

5.2.2 Construction and LERRD

Construction would be in accordance with the USACE's regulations and standards. Lands, easements, right-of-ways, relocations and disposal areas (LERRD) would be the responsibility of the CPRAB (Appendix C).

5.2.3 Cost Sharing

The State of Louisiana, acting through the PLD, is the non-Federal sponsor for the feasibility study. The cost-share during the feasibility phase is 50% Federal and 50% non-Federal. Following the feasibility phase, the CPRAB will be the non-Federal Sponsor for the planning, design, construction, operation, maintenance, repair, replacement and rehabilitation of the project. The cost share for the planning, design and construction of the project will be 65% Federal and 35% non-Federal. The CPRAB must provide all project LERRD required for the project. OMRR&R of the project would be a 100% CPRAB responsibility. A full description of the non-Federal and Federal responsibilities after the feasibility phase of the project is contained in Section 8.2 of this report. The OMRR&R costs are estimated to have a present value of $4,128,075 at 2012 price levels and include a 25% contingency. AM&M costs are not included in the estimate at this time; those costs will be included in the final report. Table 5-2 presents the cost apportionment.

Table 5-2: Cost apportionment of the TSP.

	Total	Federal	Non-Federal
PED	$7,500,000	$4,875,000	$2,625,000
Construction	$761,051,070	$557,500,446	$203,550,625
Pipeline Relocations	$35,100,000	-	$35,100,000
Lands, Easements, & ROW*	$84,700,000	$15,052,750	$69,647,250
Total First Costs**	**$888,351,070**	**$577,428,196**	**$310,922,875**

*** Federal costs are Administrative Cost of Non-Federal Sponsor Oversight**
**** Monitoring and Adaptive Management costs not included.**

5.3 Mitigation Plan

Although mitigation planning was integrated into the overall plan formulation process, implementation of the TSP requires compensatory mitigation for unavoidable project-induced

impacts that will require replacing or providing substitute resources. A mitigation plan for the TSP will be completed following the feasibility level design and analysis and will be included in the final report. Additional information is located in Appendix A.

5.4 Adaptive Management & Monitoring

Incorporation of AM&M activities into the mitigation plan will address ecological and other uncertainties that could prevent successful implementation of mitigation project measures. The AM&M Plan will establish a framework for decision-making that utilizes monitoring results and other information, as it becomes available, to update project knowledge and adjust mitigation management actions through adaptive management. Integration of AM&M into the mitigation project will ensure success under a wide range of conditions and enable implementing corrective actions in cases where monitoring demonstrates that the mitigation project or measures are not achieving ecological success. An AM&M plan will be developed and included as part of the mitigation plan in the final report. Additional information is located in Appendix A.

5.5 Views of the Non-Federal Sponsor

The PLD and the CPRAB support and recognize the importance of hurricane risk reduction in St. Charles, St. John the Baptist and St. James Parishes. This study is included in the 2012 Louisiana Comprehensive Master Plan for a Sustainable Coast and is supported by the Louisiana Congressional delegation. The USACE has worked as a team along with an interagency team and local stakeholders to develop a feasible comprehensive plan that would provide hurricane storm surge risk reduction to the citizens in the area. Construction of the proposed system would immediately allow for improved storm surge risk reduction in the three-parish area, which could potentially reduce life, health and safety risk to residents and interruptions to vital hurricane evacuation routes.

Figure 5-1: St. James Parish flooding after Hurricane Isaac.

APPENDIX C

Description of Project Alternatives A,C and D from *"West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study, Integrated Draft Feasibility Report and Environmental Impact Statement, August, 2013"*

Four plans with non-structural measures were carried forward and identified as follows:

Plan 9 + non-structural → **Alternative A**
Plan 10 + non-structural → **Alternative B**
Plan 11+ non-structural → **Alternative C**
Plan 12 → **Alternative D**

These alternatives were further evaluated considering alignments with respect to the I-10 corridor. Alternative B would not provide greater risk reduction for the evacuation routes than any of the other plans. Alternative B would reduce risk to the same number of structures as Alternative C but would enclose approximately 4,000 more acres of wetlands. Based on this, Alternative B was eliminated.

3.5 Final Array of Alternatives (*NEPA required)

The final array of alternatives carried forward for consideration included **the No Action Alternative**, **Alternative A**, **Alternative C**, and **Alternative D** (Figure 3-4). Engineering details on each can be found in Appendix B. Comparative details are shown in Table 3-2. The team assumed that Alternatives A, C, and D would provide equal levels of risk reduction. The least costly plan would have the highest net benefits. Analysis is based on a 1% AEP storm event.

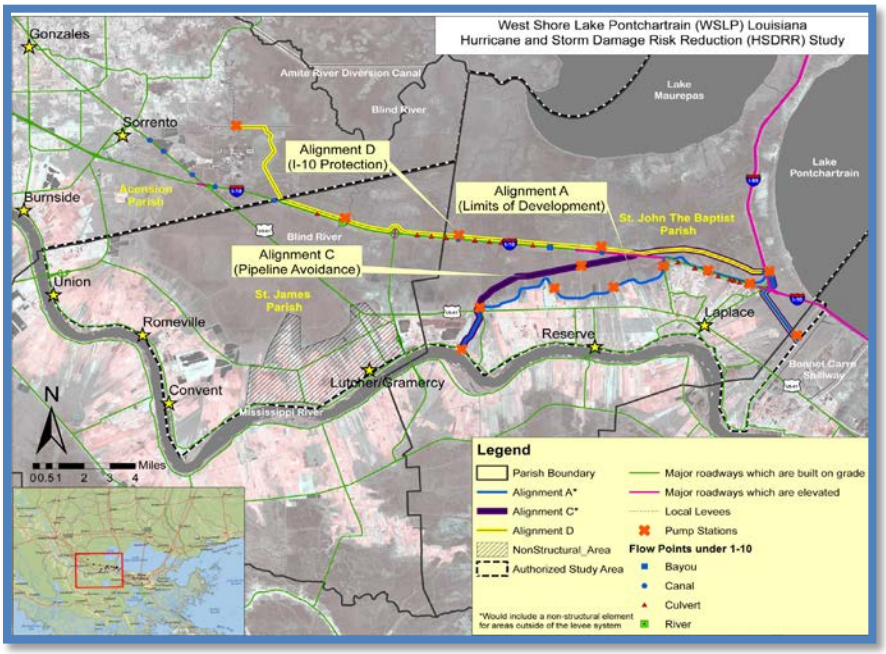


Figure 3-4: Final array of alternative plans.

No Action Alternative (Future without-project condition)

Under the No Action Alternative no risk reduction would occur. The area would continue to experience storm surge damage. This would be exacerbated by RSLR and increased impacts to wetlands due to salinity. As wetlands erode and subside, they would provide less risk reduction.

Table 3-2: Comparative details for final array of alternative plans.

Alternative	Length of Alternative	Size of Study Area Behind Alternative	Number of Structures Behind Alternative	Communities Behind Alternative	Miles of I-10 Behind Alternative	Wetlands Behind Alternative	Number of Pipeline Crossings
A	20 miles	38 sq miles	16,919	Montz, Laplace, Reserve, Garyville	4 miles	~5 sq miles	70
C	18 miles	47 sq miles	16,919	Montz, Laplace, Reserve, Garyville	4 miles	~16 sq miles	36
D	28 miles	160 sq miles	21,840	Montz, Laplace, Reserve, Garyville, Lutcher, Gramercy, Grandpoint	15 miles	~79 sq miles	14

Alternative A: Bonnet Carré Spillway to the Hope Canal to Mississippi River

Alternative A (Figure 3-5) would provide risk reduction to St. Charles, St. John the Baptist and St. James Parishes. The approximately 20.41-mile levee and floodwall alignment begins at the West Guide levee of the Bonnet Carré Spillway, north of transmission line and pipeline corridors and extends west around the interstate interchange and along the wetland/non-wetland interface. The alignment turns south near Hope Canal, until it reaches the Mississippi River Levee (MRL). Elevation and/or acquisition of structures outside of the alignment would reduce risk of storm surge-related damage in areas west of the Hope Canal.

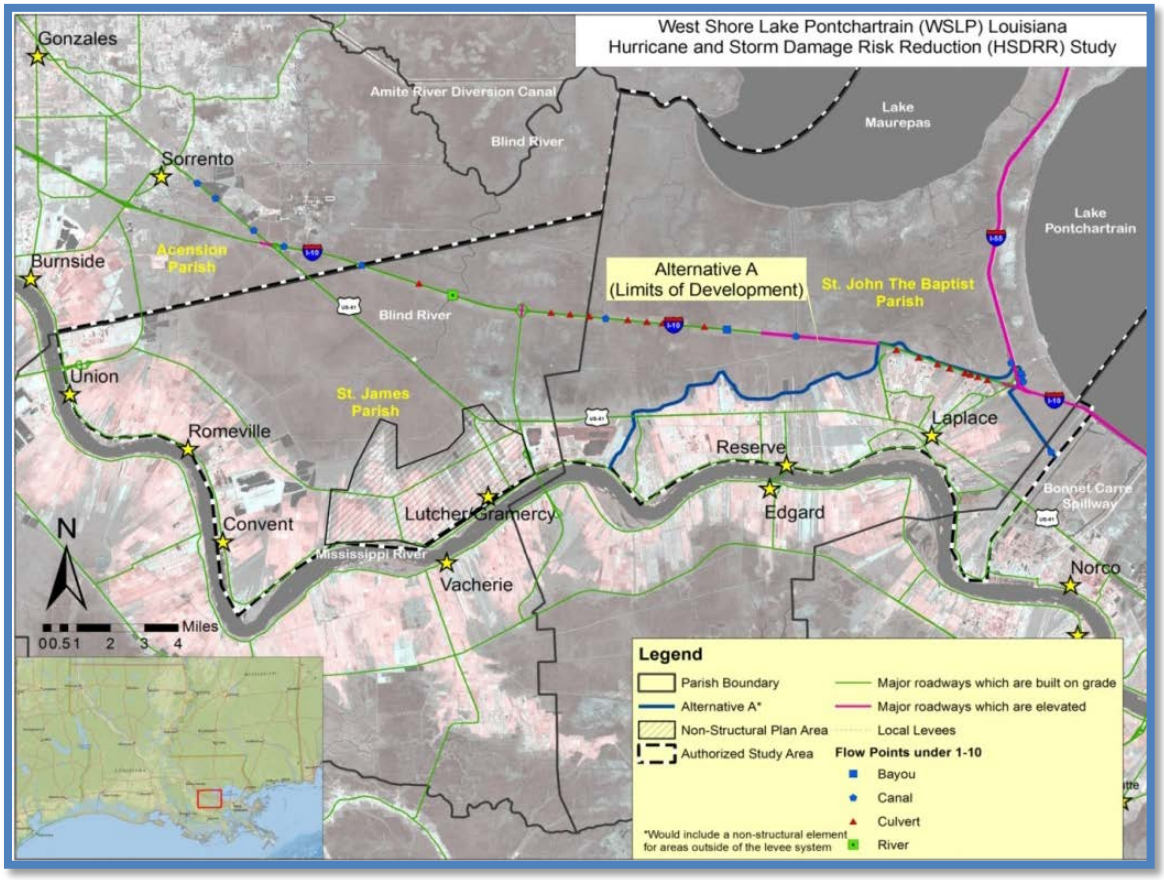


Figure 3-5: Alignment and features of Alternative A.

Construction would require roughly 3,100,000 cubic yards of earthen borrow material; 3,700,000 yards of geotextile fabric; 30,000 cubic yards of aggregate limestone road; nearly 5,000 linear feet of T-walls to cross under the interstate, or as frontal risk reduction for pump stations; 1,200 linear feet of flood gates; 240 linear feet of drainage gates; and 2 railroad gates. Eight pump stations on the alignment would require 25,000 cubic yards of concrete, 230,000 square feet of sheet pile, nearly 7,000 tons of riprap, and 151,000 linear feet of concrete piles. Multiple culverts with flap gates would be constructed. Because the alternative hugs the wetland/non-wetland interface, Alternative A has the least adverse wetland impacts. However, the plan has the greatest residual risk (the risks left after all construction and safety measures have been assessed) because overtopping of the levee by surge would cause immediate inundation of populated areas. It also has the most pump stations which results in more maintenance and greater risk of system failure. It is the least adaptable because expansion of the levee would require the purchase and/or relocation of existing structures. The plan does not reduce risk to infrastructure in St. James Parish.

Alternative C: Bonnet Carré Spillway to the Hope Canal to Mississippi River

Alternative C (Figure 3-6) evaluates the feasibility of avoiding multiple pipeline and utility crossings. It follows the Alternative A alignment between the West Guide levee of the Bonnet Carré Spillway to the US-51 interchange, where it then tracks north across US-51 and along a pipeline transmission corridor. The approximately 18.27-mile alignment crosses I-10 and follows the pipeline corridor through wetlands near the Belle Terre exit until it reaches Hope Canal. The alignment then turns south and extends to the MRL. Elevation and/or acquisition of structures outside the alignment would reduce risk of storm surge-related damage to structures in areas west of the Hope Canal.

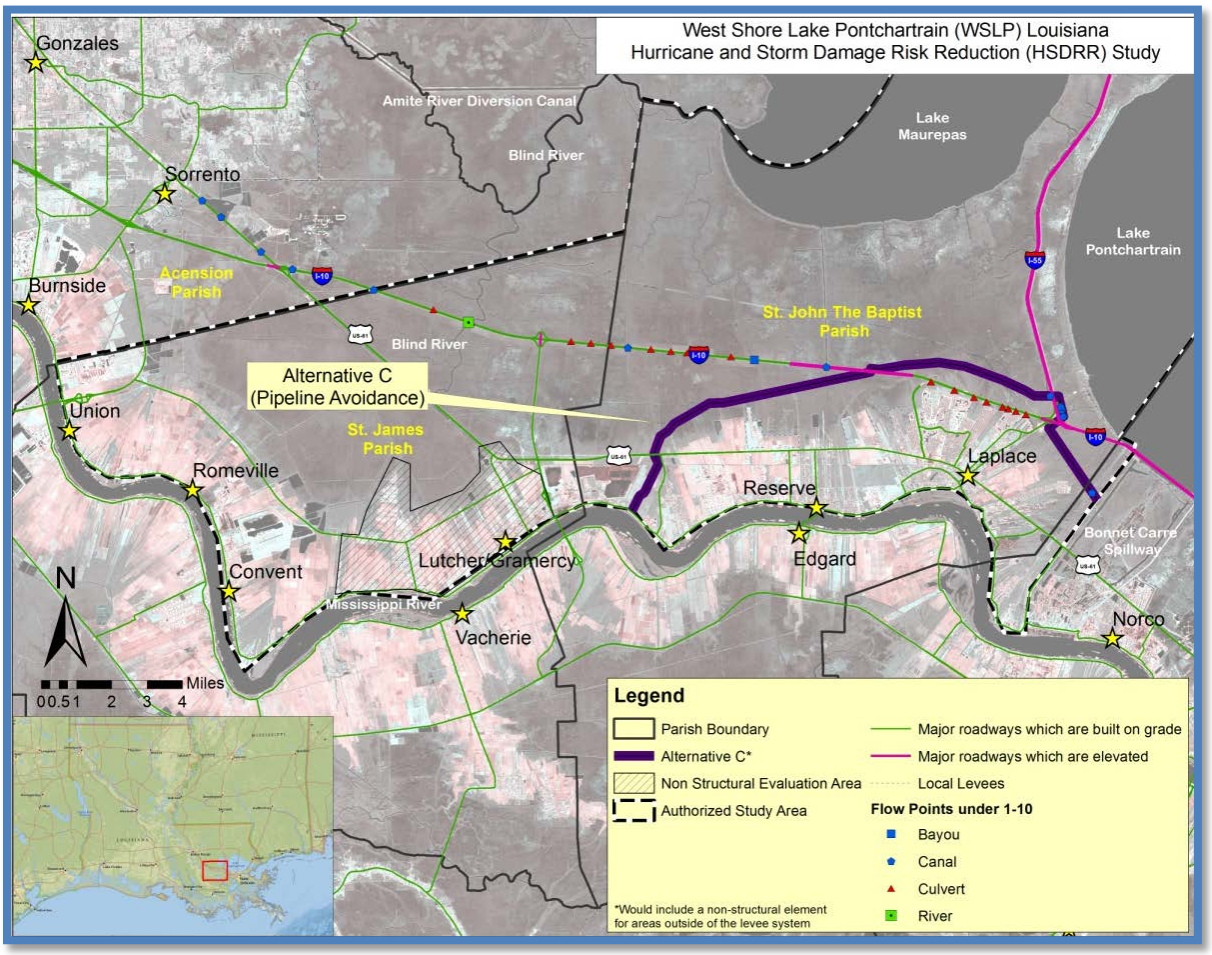


Figure 3-6: Alignment and features of Alternative C.

Construction of the alternative would require roughly the same amount of borrow material as Alternative A. It would require 3,365,000 cubic yards of geotextile fabric; nearly 26,000 cubic yards aggregate limestone road; 5,300 linear feet of T-walls; 300 linear feet of flood gates; 200 linear feet of drainage gates; 4 pump stations; and 2 railroad gates. Environmental structures similar to those identified for Alternative A would be built. This alternative encloses more wetlands than Alternative A, and would require more environmental structures, but has less residual risk because levee overtopping would not immediately inundate populated areas. It is more adaptable should changing conditions require modifications to the structures because the alignment does not abut existing structures. However, the plan does not reduce risk to infrastructure in St. James Parish.

Alternative D: Bonnet Carré Spillway to Ascension Parish

Alternative D (Figure 3-7) is a westward extension of the Alternative C alignment along the I-10 corridor into Ascension Parish. It continues west at the St. James Parish line slightly north of I-10 until it reaches the Old New River, where it proceeds north to the non-Federal Laurel Ridge levee in Ascension Parish. Measures to maintain water flow and to reduce impacts to enclosed wetlands would be built. Alternative D reduces risk to communities in St. Charles, St. John and St. James Parishes and provides a level of risk reduction to a segment of the I-10 hurricane evacuation route.

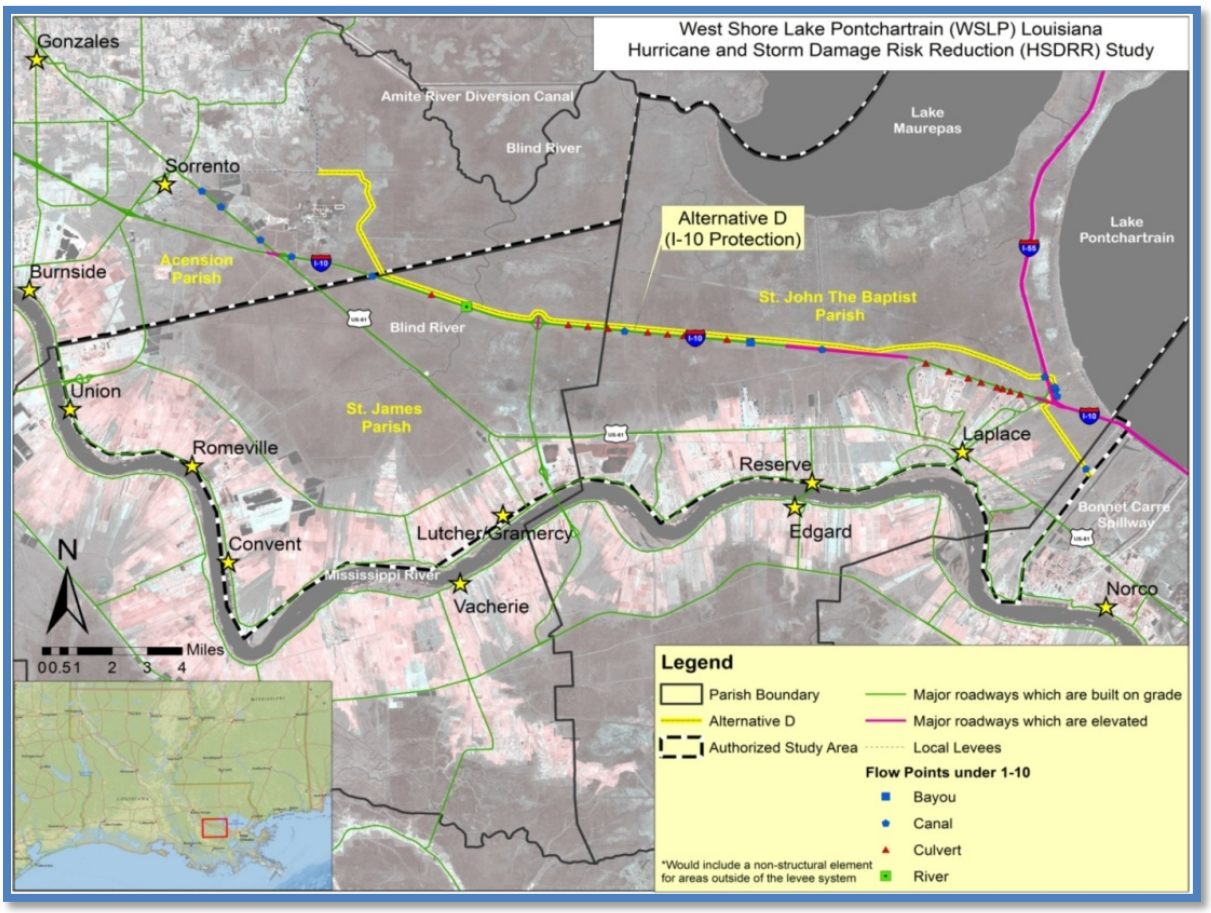


Figure 3-7: Alignment and features of Alternative D.

Construction of the approximately 28-mile alternative would require 3,700,000 cubic yards of borrow material, 3,037,000 square yards of geotextile fabric; approximately 37,000 cubic yards of aggregate limestone road; just over 4,000 linear feet of T-walls; 300 feet of flood gates; 400 feet of drainage gates; approximately 6 pump stations; nearly 24,000 cubic yards of concrete; almost 200,000 square feet of sheet pile; approximately 5,900 tons of rip rap; 154,000 linear feet of concrete piles; and environmental structures, most notably at Blind River, a Louisiana Scenic River. It encloses the most acres of wetlands requiring more environmental structures than any of the other alternatives. Each of these structures would require maintenance because failure of the environmental structures could increase adverse environmental impacts. The greater number of structures results in more maintenance and a greater risk of failure. There is concern about potential impounding of large areas of wetlands under this alternative, especially if the river diversion projects are constructed. Alternative D provides the greatest structural risk reduction and would reduce risks to roads and other infrastructure in St. James Parish.

3.6 Cost Estimates

Estimated costs for levees, floodwalls, and pump stations; real estate costs; operation and maintenance, repair, rehabilitation and replacement (OMRR&R); environmental mitigation; and non-structural features were totaled for each alternative and compared to each other to help identify a TSP. Costs for the non-structural features of Alternative A and Alternative C, and costs associated with mitigation for indirect impacts are uncertain. For this reason, a range of costs was developed for each feature.

Non-structural Cost: Non-structural costs were based on a 100% structure survey of area improvements. The cost of raising and/or acquiring structures located in the 2020 and 2070 100-year floodplains was evaluated by comparing the cost of elevating the structure to the cost of acquiring the structure. The lesser cost was used to determine the cost of the non-structural feature. RSLR greatly impacts the number of structures to be raised, resulting in uncertainty as to how many structures would have to be raised by any given date. A minimum cost of the non-structural feature of $53,143,789 was developed based on the cost of reducing risk to structures in the 2020 100-year floodplain. A maximum cost of $305,256,794 was developed based on the cost of reducing risk to structures in the 2070 100-year floodplain. The maximum cost was used for comparison.

Indirect Impact Cost: At this stage, mitigation costs for indirect impacts remain uncertain due to limited hydrologic information and lack of a full wetland value assessment (WVA). To reduce the uncertainty of costs associated with mitigating for indirect impacts, a maximum cost based on Morganza to the Gulf and Lake Pontchartrain and Vicinity project estimates, and a minimum cost based on local mitigation bank costs were developed. These costs were averaged. In place of WVA analysis, habitat reduction values from 5 - 75 percent were calculated. Using these values, the average estimated mitigation cost associated with indirect impacts ranged from $871,000,000 to $980,000,000 for Alternative A, $844,000,000 to $1,000,000,000 for Alternative C, and $672,000,000 to $2,200,000,000 for Alternative D.

Based on available information, the habitat reduction value impacts are estimated to be approximately 15 percent of the total enclosed wetlands, as shown in Table 3-3. The risk reduction features will be designed to maintain existing hydrologic flows to the extent practicable. If this can be achieved, indirect impacts would be limited to those that occur during closure of structures for storm surge events – an estimated 8.5 days per year. A WVA analysis based on hydrologic modeling will be conducted on the TSP during feasibility design.

Table 3-3: Estimated first costs for final array of alternative plans.

	Alternative A	Alternative C	Alternative D
Levees & Floodwalls	$335,898,670	$334,156,997	$339,508,346
Pump Stations	$132,162,500	$112,687,500	$166,437,500
Pipeline Relocations	$70,300,000	$35,100,000	$11,693,750
Real Estate	$3,849,000	$3,283,000	$2,434,000
Direct Habitat Impacts	$17,000,791	$35,710,811	$43,323,364
Indirect Mitigation Cost (15%)	$23,123,679	$54,655,968	$327,687,626
Non-Structural 2070*	$305,256,794	$305,256,794	$0
Total Cost	**$887,591,434**	**$880,851,070**	**$891,084,586**

***Some non-structural costs will be LERRD costs that are the responsibility of the NFS. The non-structural costs will be spread over the entire period of analysis and will be heavily discounted and result in less than 17% of the total average annual costs.**

OMRR&R Cost: Table 3-4 provides preliminary OMRR&R cost estimates for each alternative. Annual costs will be refined during feasibility level design and analysis. Upon notice of

completion of construction of the project, or a functional portion of the project, the CPRAB shall commence OMRR&R responsibilities for the project (Chapter 8).

Table 3-4: Comparison of annual OMRR&R cost for final array of alternative plans.

Alternative A	390	$234,000	$7,277,050	$7,511,050
Alternative C	868	$520,800	$3,607,275	$4,128,075
Alternative D	1269	$761,400	$5,421,538	$6,182,938

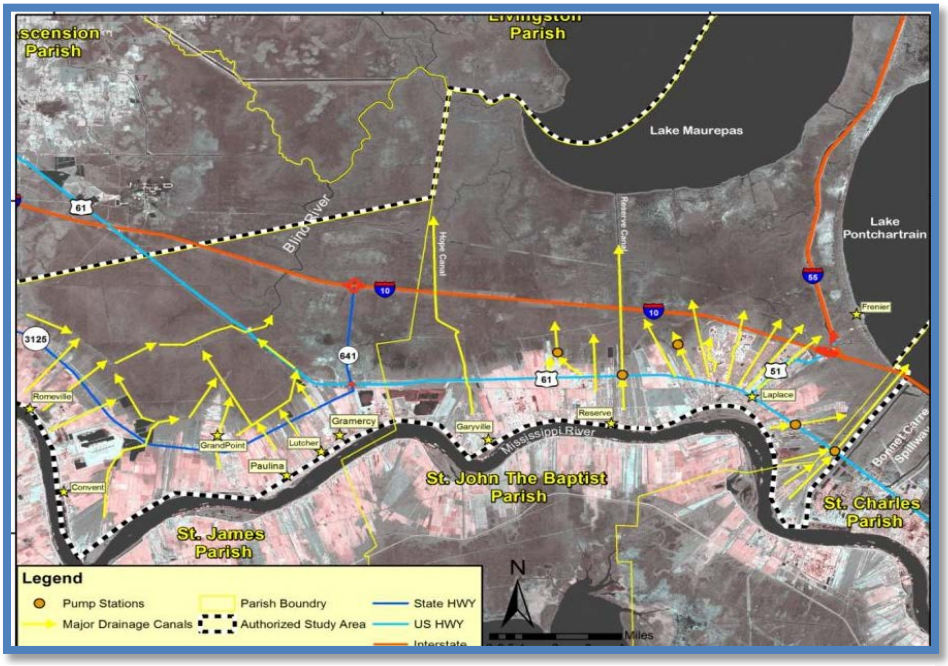
NOTE: Based on levee right-of-way acreage, 2012 dollars, and includes a 25% contingency. OMRR&R costs for mitigation are not included. Cost include grass cutting; pump station and flood gate replacement; and other planned OMRR&R activities.

3.7 Summary of Accounts and Comparison of Alternatives

Plans in the final array are assumed to provide equal levels of risk reduction. To facilitate evaluation and comparison of the alternatives, four Federal Accounts were used to assess the effects of alternatives. The accounts are National Economic Development (NED), Environmental Quality (EQ), Other Social Effects (OSE), and Regional Economic Development (RED).

No Action Alternative: No NED benefits would be associated with the No Action Alternative. There would continue to be adverse impacts to the EQ as salinity levels increase in the area, affecting wetlands and eventually causing impacts to residents (OSE) in the immediate vicinity of the study by reducing the natural swamp buffer. Reducing the natural buffer could also cause uncertainty to RED by impacting major oil refineries in the region and the overall economy.

Alternative A: Alternative A provides NED benefits, but provides less net benefits than Alternative C. It encloses the fewest acres of wetlands, resulting in the least adverse impacts to EQ. However, it risks immediate inundation of developed areas in an overtopping event; thus reducing safety to residents (OSE) in the area. It limits future modification or reinforcement of the system due to its proximity to existing structures. It would also risk disruptions to the local drainage patterns northward if design parameters are exceeded. (Figure 3-8). While Alternatives C and D would disrupt existing drainage if design parameters are exceeded, the damage resulting would be greatest for Alternative A due to



the close proximity of the levee to existing structures. There is no risk reduction to roads in St. James Parish which could flood, preventing employees from accessing vital industries.

Alternative C: Alternative C maximizes benefits. It has more adverse impacts on EQ than Alternative A but reduces impacts to wetlands compared to Alternative D. In case of a major storm surge event that exceeds the federally authorized project design, Alternative C could reduce the risk to OSE because storm surge would, over time, first fill in the wetlands before potentially inundating developed areas. Because this alternative addresses an uncertain yet reasonably foreseeable need to modify the system, it could provide stability to RED in developed areas. The alignment can be enlarged should RSLR be greater than anticipated without displacing area residents. There is no risk reduction to roads in St. James Parish.

Alternative D: Alternative D provides NED benefits, but does not maximize those benefits. It provides risk reduction to a larger area thus reducing risk to more area residents. Structural risk reduction is provided to roads in St. James Parish, reducing the risk that employees would be unable to access critical infrastructure and places of employment. Additionally, because the levee is not located in close proximity to existing structures, the threat of flooding due to exceedence of design parameters is lessened. Alternative D poses potential uncertainties concerning the impoundment of large areas of wetlands, especially if the river diversion projects are constructed. While it would prevent saltwater intrusion, it would risk impacting hydrology by enclosing approximately 54,800 acres of swamp and would impact the EQ of the Maurepas WMA as well as Blind River, a Louisiana Scenic River. Per the Wild and Scenic River Act, construction within 100 feet of a scenic stream requires a permit.

Economic Costs Comparison: The parametric implementation costs were annualized using the current interest rate (3.75%) and a 50 year period of analysis (2020-2070) as shown in Table 3-5. In 2020, only 5% of the benefits are derived from St. James Parish and only 219 structures are located within the 100-year floodplain. The cost of the non-structural feature for Alternatives A and C increases from approximately $53,000,000 (in year 1) to over $305,000,000 (in year 50) due to RSLR. Most of the structures would not reside in the 100-year floodplain until the later years of the period of analysis. Because of this, the non-structural costs were spread evenly over a 53-year period beginning in 2017 and ending in 2069; and then compounded or discounted to the 2020 base year. The annual benefits were compared to the cost assuming a 100-year level of risk reduction. The total annual benefits were then compared to the total annual costs.

Table 3-5: Economic comparison of final array of alternative plans.

Alternative	Implementation Costs ($ millions)	Annual OMRR&R ($ millions)	Equivalent Annual Benefits ($ millions)	Annual Costs ($ millions)	Benefit-to-Cost Ratio	Annualized Net Benefits ($ millions)
A	887.6	7.5	59.9	40.5	1.48	19.4
C	881.0	4.1	59.9	36.8	1.63	23.0
D	891.1	6.2	59.9	46.7	1.28	13.2

Alternative C has the lowest cost and the highest net benefits followed by Alternative A and Alternative D. The preliminary benefit to cost ratio (BCR) for Alternative C is equal to 1.63 to 1 with annualized net benefits of approximately $23,000,000. For Alternative A the BCR is 1.48 and for Alternative D it is 1.28 with net benefits of $19,400,000 and $13,200,000, respectively.

Hydrologic information is limited, so estimates were not developed to evaluate the number of environmental structures that would be required for the alternatives. The inclusion of environmental structures could greatly increase the cost of Alternative D, which encloses 79 square miles of wetlands, in comparison to Alternative A (5 square miles) and Alternative C (15 square miles). Benefits such as reductions in emergency costs and damage to roadways have not been calculated and would expect to be greatest for Alternative D and the least for Alternative A. These benefits are usually minimal and would not impact the selection of the TSP.

Alternative A tracks the wetland-non-wetland interface in Laplace to its termination at the Hope Canal in western St. John the Baptist Parish. It requires the largest number of pump stations (8 pump stations) compared to Alternative C (4 pump stations) and would require approximately $7,500,000 in OMRR&R cost to maintain the fully constructed alternative compared to $4,100,000 in OMRR&R for Alternative C. If overtopped, Alternative A would allow immediate inundation at developed areas and I-10, resulting in the greatest residual risk.

3.8 Identifying the Tentatively Selected Plan

Alternative C is the tentatively selected plan (TSP) and the NED plan as determined by the evaluation criteria. It fulfills the planning objectives stated in Section 1.5. It reasonably maximizes net benefits, consistent with protecting the Nation's environment in accordance with national environmental statutes, applicable Executive Orders, and other Federal planning requirements.

APPENDIX D

Project Functions and Current Issues

The following list of ***project functions*** were identified and considered as a basis for possible improvement to the current project plan:

Protect Life/Property	Sustain Commerce
Block Surge	Remove Water
Drain Rainfall	Maintain Drainage
Convey Flow	Place Barrier
Lift Water	Prevent Backflow
Reduce Overtopping	Prevent Breaching
Dissipate Energy	Prevent Erosion
Maintain Pipeline Commerce	Elevate Structure
Protect Structures	Relocate Structures

Current project issues as reported by the project managers are:

- Design and decision data is limited by new Smart Planning guidance
- Non-structural measures difficult to quantify and incrementally justify
- Project is politically sensitive; public perception and desire for maximum structural alternative
- Controversy with determination of environmental impacts versus potential benefits when addressing wetlands and swamp that would be on the protected side of the levee.

Battelle
The Business of Innovation

October 28, 2013

Final Independent External Peer Review Report West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection St. Charles, St. John the Baptist, and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/Environmental Impact Statement

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Coastal Storm Risk Management National Planning Center of Expertise
Baltimore District

Contract No. W911NF-11-D-0001
Task Order: 13-045
Delivery Order Number: 0209

Final Independent External Peer Review Report
West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection
St. Charles, St. John the Baptist, and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/Environmental Impact Statement

by

Battelle
505 King Avenue
Columbus, OH 43201

for

Department of the Army
U.S. Army Corps of Engineers
Coastal Storm Risk Management National Planning Center of Expertise
for the Baltimore District

October 28, 2013

Contract No. W911NF-11-D-0001
Task Order: 13-045

**This work was performed under the auspices of the
U.S. Army Research Office Scientific Services Program
administered by Battelle Memorial Institute,
Contract No. W911NF-11-D-0001.**

Final Independent External Peer Review Report
West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection
St. Charles, St. John the Baptist, and St. James Parishes, Louisiana,
Integrated Draft Feasibility Report/Environmental Impact Statement

by

Julian DiGialleonardo
Battelle
505 King Avenue
Columbus, OH 43201
(561) 656-6303; digialleonardoj@battelle.org

for

Department of the Army
U.S. Army Corps of Engineers
Coastal Storm Risk Management National Planning Center of Expertise
Baltimore District
CENAB-PL-P, 10 South Howard Street
Baltimore, MD 21201
Mark Chalecki
(410) 962-4998, mark.s.chalecki@usace.army.mil

October 28, 2013

The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation.

DISTRIBUTION STATEMENT
May not be released by other than sponsoring organization without approval of US Army Research Office, P.O. Box 12211, Research Triangle Park, NC 27709.

DESTRUCTION NOTICE
For unclassified, limited documents, destroy by any method that will prevent disclosure of contents or reconstruction of the document.

This page is intentionally left blank.

Final Independent External Peer Review Report for the

West Shore-Lake Pontchartrain, Louisiana Hurricane Protection St. Charles, St. John the Baptist, and St. James Parishes, Louisiana Integrated Draft Feasibility Report/Environmental Impact Statement

EXECUTIVE SUMMARY

Project Background and Purpose

The purpose of the West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection St. Charles, St. John the Baptist, and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/ Environmental Impact Statement (IDFR/EIS) project is to determine the Federal interest in implementing a hurricane protection levee system to provide protection to St. Charles, St. John the Baptist, and St. James parishes against hurricane-induced tidal surges originating from Lake Pontchartrain and Lake Maurepas.

The specific plan formulation rationale for the feasibility study has evolved over the course of the many prior studies regarding hurricane and storm damage risk reduction in the study area. Due to the changing natural and social dynamics in the area, all prior formulations and rationales are being revisited during this feasibility study. These include the previously developed non-structural measures (evacuation, elevation of structures, and property acquisitions), and the structural measures (levees, floodwalls, flood gates, pump stations, tidal exchange structures, and water storage areas). Since the authorization for this study provides for hurricane protection and flood control in St. Charles, St. John the Baptist, and St. James parishes, the alternatives to be evaluated are being limited to the needs in these three parishes.

Independent External Peer Review Process

The United States Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the West Shore-Lake Pontchartrain (WSLP) IDFR/EIS (hereinafter WSLP-IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012a). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate the IEPR of the WSLP-IEPR review documents. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses. The WSLP-IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2012a) and OMB (2004). This final report describes the WSLP-IEPR process, describes the panel members and their selection, and summarizes the Final Panel Comments of the WSLP-IEPR Panel (the Panel).

Based on the technical content of the WSLP-IEPR review documents and the overall scope of the project, Battelle consulted with the Louisiana Water Resources Council (LWRC) Primary

Panel Members to assess their expertise in the following key technical areas: Civil Works planning, economics, biology/ecology, hydrology and hydraulic (H&H) engineering, civil/mechanical engineering, and geotechnical/structural engineering. Since the requirement for a geotechnical/structural engineering expert was outside the expertise of the LWRC Primary Panel, Battelle contacted experts in the LWRC Candidate Pool who met this requirement. Battelle evaluated these candidate panel members in terms of their technical expertise and potential COIs. Six panel members were selected for the WSLP-IEPR. USACE was given the list of candidate panel members, but Battelle made the final selection of the Panel.

The Panel received an electronic version of the WSLP-IEPR IDFR/EIS and associated appendices, along with a charge that solicited comments on specific sections of the documents to be reviewed. USACE prepared and provided the charge questions to Battelle. Battelle reviewed the charge questions and, when necessary, made revisions, additions, or deletions to address any consistency, clarity, and wording issues. The final charge questions follow guidance provided in USACE (2012a) and OMB (2004), and were included in the draft and final Work Plans.

The USACE Project Delivery Team (PDT) briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the review to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. Other than Battelle-facilitated teleconferences, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced individual comments in response to the charge questions.

IEPR panel members reviewed the WSLP-IEPR documents individually. The panel members then met via teleconference with Battelle to review key technical comments and reach agreement on the Final Panel Comments to be provided to USACE. None of the charge questions generated conflicting responses from the panel members. Each Final Panel Comment was documented using a four-part format consisting of: (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium, or low); and (4) recommendations on how to resolve the comment. Overall, 19 Final Panel Comments were identified and documented. Of these, 12 were identified as having medium significance, and 7 had low significance.

Results of the Independent External Peer Review

The panel members agreed among one another on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012a; p. D-4) in the WSLP-IEPR review documents. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Appendix A of this report. The following summarizes the Panel's findings.

The Panel agreed that the WSLP-IEPR review documents and appendices are well-written and concise; the Panel recognizes that the Specific Measurable Attainable Risk Informed Timely (SMART) Planning approach was applied to this study by USACE and appreciates the efficiency and clarity with which the project information was presented, in accordance with this approach. While the Panel believed that the main points were presented clearly, it identified areas where additional documentation and clarification is warranted.

Civil Works Planning – The Panel found that the process used to select the recommended alternative was rational and conducted in a reasonable manner; however, data sources, analytical findings, and references associated with the development and the analyses of project alternatives are not well-documented. This information is important to provide, especially for projects developed within the parameters of the SMART Planning framework. The Panel believes this issue can be addressed by adding references and summaries of the analyses underlying the IDFR/EIS to understand the development and costing of the project and the plan selection process.

The Panel noted that the IDFR/EIS does not describe the process for verifying key assumptions, nor does it explain how the plan formulation process will be iterated in response to any changes in key assumptions and how the Tentatively Selected Plan (TSP) may be affected. This concern can be addressed by reviewing the list of uncertainties for completeness, identifying which uncertainties will be addressed during further feasibility assessment, and explaining how the plan formulation process will be iterated in response to any changes in key assumptions.

Engineering – Although the technical analyses supporting the report are very preliminary and will require extensive refinement and additions during the development of the feasibility-level report, the studies to date adequately support the evaluation of alternatives and the selection of Alternative C as the TSP. The civil design is based upon a clear understanding of the project objectives and appropriate design criteria. The Panel noted, however, that the absence of geotechnical site data creates significant uncertainty with regard to the soil conditions to be encountered for the TSP, and that the need to acquire this missing information early in the subsequent design phase is not addressed. Without a complete assessment of high-level geotechnical engineering activities that are required during the design phase, the cost comparison across alternatives could be affected; however, the project's technical feasibility is not likely to be affected. This issue can be addressed by including a discussion in the IDFR/EIS acknowledging the need to obtain additional borings for the Alternative C alignment.

The Panel noted that a plan for the disposal of excavated fill materials from the drainage channel is not incorporated into the proposed design. The accuracy cost estimate, real estate requirements and the potential environmental impacts of the project cannot be verified or understood without including a disposal plan for excavated material in the design. This documentation issue can be addressed by refining the interior drainage analysis to verify the required size of the drainage channel, developing a plan to dispose of excavated material and including a discussion of the plan in the IDFR/EIS, conducting appropriate stability analyses to validate on-site disposal options, modifying cost estimates, and revising the assessment of environmental impacts to reflect the adopted disposal plan.

In addition, the Panel found that the preliminary assessment of flood impacts does not allow for a full evaluation of potentially induced flooding, and flood mitigation measures that may need to be implemented are not identified. The level of flood analysis completed to date is not sufficiently refined to determine whether induced flooding will occur inside or outside of the proposed levee. The Panel recommends using ADCIRC and STWAVE to simulate the TSP, completing detailed rainfall-runoff modeling of the TSP, and including examples of feasible on-site and off-site flood mitigation measures as part the TSP.

Economics – The Panel acknowledges that the stated goals of Planning Objectives 2 and 5 as identified in the IDFR/EIS are to reduce risk to residents' lives and to reduce risk of damage and loss of critical infrastructure. However, it is difficult to assess the degree to which the residual risks (e.g., from levee overtopping or levee failure) under each alternative have been reduced because the residual risk has not been quantified. This issue can be addressed by performing a quantitative analysis of the residual risk to residents' lives and to evacuation infrastructure under each alternative.

The Panel believes that the incremental economic analysis of the benefits and costs of each separable non-structural element is needed at this stage in the planning process to ensure that the comparison of alternatives identifies the TSP with the highest net benefits possible. An economic evaluation of the separable non-structural measures will improve the defensibility of the analysis and support the determination of the National Economic Development (NED) plan and TSP. This can be accomplished by performing a reach-by-reach comparison of the monetary benefits and costs of the non-structural measures and iterating on plan formulation steps as needed to verify or revise the selection of the NED plan and TSP. Furthermore, without the assurance that necessary non-structural measures will be implemented over the 50-year time period, there is no longer equivalence of risk reduction and, hence, no longer equivalence in the benefits of Alternatives A, C, and D over the 50-year time period. In this case, an economic analysis cannot rely solely on a comparison of costs across alternatives. The Panel recommends that for each alternative, the benefits and costs that are equally certain and under the control of USACE be calculated, without relying on the actions of local entities to achieve equal benefits across alternatives.

Environmental – The Panel believes that the results of the environmental analysis are technically sound at this point in the project, but the analysis could be strengthened by elaborating on some key issues. The Panel noted that the cumulative effects analysis does not consider other past, present, and future projects in the region and does not provide the degree of detail necessary to comply with National Environmental Policy Act (NEPA) requirements. The report would benefit from a comprehensive list and description of reasonably foreseeable future actions and activities (based on known future projects, and past/predictable development patterns) that are anticipated to occur in the project area. It would also be useful to include a discussion, in concert with SMART Planning, of the forecasted positive and negative cumulative effects that the TSP may have on those activities. The potential effects of climate change on the TSP do not appear to have been considered; this issue can be addressed by describing the potential effects of climate change and how these potential effects were considered during the plan formulation process. Additionally, a discussion of the rationale for selecting Alternative C as the TSP is also warranted to fully address the concerns expressed in the public comments.

Mitigation costs for direct and indirect habitat impacts are a large component of the relative cost difference between alternatives. Should wetlands impacts prove to be larger than estimated and mitigation costs higher than predicted, the selection of the TSP may require re-evaluation. This component of risk and uncertainty is not discussed, but this issue could be addressed by discussing the current understanding of hydrology associated with the TSP, the qualitative nature of the wetlands assessment, the margin of error assumed, and future studies that are planned to more quantitatively and thoroughly evaluate all wetlands effects resulting from the TSP.

Table ES-1. Overview of 19 Final Panel Comments Identified by the WSLP-IEPR Panel

1	A plan for disposal of the large volume of excavated fill materials from the drainage channel is not incorporated into the proposed design, and the many factors associated with the disposal of excavated material that could increase project costs and environmental impacts are not addressed.
2	The process for verifying key assumptions and the potential effects of this process on the future development of the Tentatively Selected Plan (TSP) are not explained.
3	The separable non-structural elements of Alternatives A and C have not been shown to be economically feasible.
4	
5	The residual risk to life (e.g., from levee overtopping or levee failure) and infrastructure of the alternatives has not been quantified.
6	
7	The economic analysis, which uses the percent reduction in damages for the top 10 damage reaches to extrapolate to the remaining reaches and to the year 2070, is not consistent with statistical principles.
8	
9	Data sources, analytical findings, and references associated with the development and the analysis of project alternatives are not well-documented.
10	The cumulative effects analysis does not consider other past, present, and future projects in the region, as required by the National Environmental Policy Act (NEPA).
11	Wetland impact assessment is preliminary; therefore, mitigation costs associated with the impacts are uncertain, which may affect the selection of the Tentatively Selected Plan (TSP).
12	

Table ES-1. Overview of 19 Final Panel Comments Identified by the WSLP-IEPR Panel (continued)

13	The basis for selecting the 100-year-flood level of protection is not provided and therefore could not be evaluated.
14	The proposed use of flap gates to provide closure under high water conditions may not be compatible with the safety or reliability requirements associated with an urban flood barrier.
15	The use of adaptability for future levee expansion as a criterion in plan formulation and alternatives evaluation is not fully described.
16	A well-defined description of the planned construction procedures is not provided; therefore, the reasonableness of the cost estimate and the technical feasibility of the design cannot be determined.
17	Potential impacts from climate change, while referred to in the documentation, are not described or analyzed in accordance with U.S. Army Corps of Engineers (USACE) policy.
18	The intermediate relative sea level rise (RSLR) scenario is presented inconsistently throughout the project documents.
19	Project operations with the intermediate scenario of relative sea level rise (RSLR) and project adaptability to higher than the intermediate scenario of RSLR are not described.

This page is intentionally left blank.

Table of Contents

Executive Summary i
1. Introduction 1
2. Purpose Of The IEPR 1
3. Methods 2
3.1 Planning and Schedule 2
3.2 Identification and Selection of IEPR Panel Members 4
3.3 Conduct of the IEPR 7
3.4 Review of Individual Comments 8
3.5 IEPR Panel Teleconference 8
3.6 Preparation of Final Panel Comments 9
4. Panel Description 10
5. Summary Of Final Panel Comments 20
6. References 25

Appendix A. Final Panel Comments on the WSLP-IEPR
Appendix B. Final Charge to the Independent External Peer Review Panel on the WSLP-IEPR

List of Tables

Table ES-1. Overview of 19 Final Panel Comments Identified by the WSLP-IEPR Panel v
Table 1. WSLP-IEPR Schedule 3
Table 2. WSLP-IEPR Panel: Technical Criteria and Areas of Expertise 10
Table 3. Overview of 19 Final Panel Comments Identified by the WSLP-IEPR Panel 23

LIST OF ACRONYMS

ASCE	American Society of Civil Engineers
ATR	Agency Technical Review
COI	Conflict of Interest
CFR	Code of Federal Regulations
CSU	Colorado State University
CSVR	Content-to-Structure Value Ratio
DrChecks	Design Review and Checking System
EC	Engineer Circular
EM	Engineer Manual
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
H&H	Hydrology and Hydraulic
HEC-FDA	Hydrologic Engineering Center-Flood Damage Reduction Analysis
HEC-HMS	Hydrologic Engineering Center-Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center-River Analysis System
HET	Habitat Evaluation Team
IDFR	Integrated Draft Feasibility Report
IEPR	Independent External Peer Review
LWRC	Louisiana Water Resources Council
NED	National Economic Development
NEPA	National Environmental Policy Act
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PDT	Project Delivery Team
PE	Professional Engineer
PFMA	Potential Failure Mode Analysis
RSLR	Relative Sea Level Rise
SAR	Safety Assurance Review
SMART	Specific, Measurable, Attainable, Risk Informed, and Timely

TSP	Tentatively Selected Plan
UF	University of Florida
USACE	United States Army Corps of Engineers
WES	Waterways Experiment Station
WSLP	West Shore-Lake Pontchartrain

1. INTRODUCTION

The purpose of the West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection St. Charles, St. John the Baptist, and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/ Environmental Impact Statement (IDFR/EIS) project is to determine the Federal interest in implementing a hurricane protection levee system to provide protection to St. Charles, St. John the Baptist, and St. James parishes against hurricane-induced tidal surges originating from Lake Pontchartrain and Lake Maurepas.

The specific plan formulation rationale for the feasibility study has evolved over the course of the many prior studies regarding hurricane and storm damage risk reduction in the study area. Due to the changing natural and social dynamics in the area, all prior formulations and rationales are being revisited during this feasibility study. These include the previously developed non-structural measures (evacuation, elevation of structures, and property acquisitions), and the structural measures (levees, floodwalls, flood gates, pump stations, tidal exchange structures, and water storage areas). Since the authorization for this study provides for hurricane protection and flood control in St. Charles, St. John the Baptist, and St. James parishes, the alternatives to be evaluated are being limited to the needs in these three parishes.

The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the West Shore-Lake Pontchartrain (WSLP) IDFR/EIS (hereinafter WSLP-IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE) Engineer Circular (EC) *Civil Works Review* (EC 1165-2-214) (USACE, 2012a) and Office of Management and Budget (OMB) bulletin *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

This final report details the WSLP-IEPR process, describes the WSLP-IEPR panel members and their selection, and summarizes the Final Panel Comments of the Panel on the existing environmental, economic, and engineering analyses contained in the WSLP-IEPR review documents. The full text of the Final Panel Comments is presented in Appendix A.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2012a).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the economic, engineering, and environmental analysis of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the WSLP-IEPR was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC No. 1165-2-214). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

3. METHODS

This section describes the method followed in selecting the members for the WSLP-IEPR Panel (the Panel) and in planning and conducting the WSLP-IEPR. The WSLP-IEPR was conducted following procedures described by USACE (2012a) and in accordance with OMB (2004) guidance. Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

3.1 Planning and Schedule

At the beginning of the Period of Performance, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the WSLP-IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan. In addition, 76 charge questions provided by USACE were reviewed by Battelle and, when necessary, were revised to address any consistency, clarity, and wording issues. Battelle included two additional charge questions that sought summary information from the panel members. The final charge questions follow guidance provided in USACE (2012a) and OMB (2004) and were included in the draft and final Work Plans. The final charge also included general guidance for the Panel on the conduct of the peer review (provided in Appendix B of this final report).

Table 1 is based on receipt of pre-award funding from the USACE Contracting Officer's Representative and the Army Research Office's Contracting Officer to begin initial work on the project (i.e., pre-award funding receipt) on August 19, 2013. The review documents were provided by USACE on September 9, 2013. Note that the work items listed in Task 6 occur after the submission of this report. Battelle will enter the 19 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the WSLP-IEPR results.

Table 1. WSLP-IEPR Schedule

Task	Action	Due Date
1	Pre-Award Funding	8/19/2013
	Notice to Proceed	8/28/2013
	Review documents available	9/9/2013
	Battelle submits draft Work Plan[a]	9/3/2013
	USACE provides comments on draft Work Plan	9/6/2013
	Battelle submits final Work Plan[a]	9/9/2013
2	Battelle requests input from USACE on the COI questionnaire	8/22/2013
	USACE provides comments on COI questionnaire	8/26/2013
	Battelle submits list of selected panel members[a]	8/30/2013
	USACE confirms the panel members have no COI	9/4/2013
	Battelle completes subcontracts for panel members	9/11/2013
3	Battelle convenes kick-off meeting with USACE	8/27/2013
	Battelle sends review documents to panel members	9/11/2013
	Battelle convenes kick-off meeting with panel members	9/12/2013
	Battelle convenes kick-off meeting with USACE and panel members	9/12/2013
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	9/25/2013
4	Panel members complete their individual reviews	9/26/2013
	Battelle provides panel members with talking points for Panel Review Teleconference	9/30/2013
	Battelle convenes Panel Review Teleconference	10/1/2013
	Battelle provides Final Panel Comment templates and instructions to panel members	10/2/2013
	Panel members provide draft Final Panel Comments to Battelle	10/9/2013
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	10/10-10/20/2013
	Battelle finalizes Final Panel Comments	10/21/2013
	Battelle provides Final IEPR Report to panel members for review	10/23/2013
	Panel members provide comments on Final IEPR Report	10/24/2013

Table 2. WSLP-IEPR Schedule (continued)

Task	Action	Due Date
5	**Battelle submits Final IEPR Report to USACE[a]**	**10/28/2013**
6[b]	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	10/29/2013
	Battelle convenes teleconference with USACE to review the Post-Final Panel Comment Response Process	10/29/2013
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	10/29/2013
	USACE provides draft Project Delivery Team (PDT) Evaluator Responses to Battelle	11/4/2013
	Battelle provides the panel members the draft PDT Evaluator Responses	11/4/2013
	Panel members provide Battelle with draft BackCheck Responses	11/6/2013
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	11/7/2013
	Battelle convenes Comment-Response Teleconference with panel members and USACE	11/8/2013
	USACE inputs final PDT Evaluator Responses to DrChecks	11/18/2013
	Battelle provides final PDT Evaluator Responses to panel members	11/18/2013
	Panel members provide Battelle with final BackCheck Responses	11/20/2013
	Agency Decision Milestone Briefing[c]	11/21/2013
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	11/22/2013
	Battelle submits pdf printout of DrChecks project file[a]	11/25/2013
	Civil Works Review Board[c]	4/17/2014
	Contract End/Delivery Date	8/14/2014

a Deliverable.

b Task 6 occurs after the submission of this report.

c The Agency Decision Milestone Briefing and Civil Works Review Board were listed in the SOW under Task 3, but relocated in this schedule to reflect the chronological order of activities.

3.2 Identification and Selection of IEPR Panel Members

Based on the technical content of the WSLP-IEPR review documents and the overall scope of the project, Battelle consulted with the Louisiana Water Resources Council (LWRC) Primary Panel Members to assess their expertise in the following key technical areas: Civil Works planning, economics, biology/ecology, hydrology and hydraulic (H&H) engineering, civil/mechanical engineering, and geotechnical/structural engineering. Since the requirement for a geotechnical/structural engineering expert was outside the expertise of the LWRC Primary Panel, Battelle contacted experts in the LWRC Candidate Pool who met this requirement. Battelle evaluated these candidate panel members in terms of their technical expertise and potential COIs. Six panel members were selected for the WSLP-IEPR. USACE was given the list of candidate panel members, but Battelle made the final selection of the Panel.

The candidates were screened for the following potential exclusion criteria or COIs.[1] These COI questions were intended to serve as a means of disclosure and to better characterize a candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

- Previous and/or current involvement by you or your firm[2] in the West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection project, St. Charles, St. John the Baptist, and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/Environmental Impact Statement.
- Previous and/or current involvement by you or your firm2 in coastal storm damage reduction, flood control, or ecosystem restoration projects in St. Charles, St. Johns the Baptist, Ascension or St. James parishes Louisiana.
- Previous and/or current involvement by you or your firm[2] in the West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection project, St. Charles, St. John the Baptist, Ascension and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/Environmental Impact Statement and related projects.
- Previous and/or current involvement by you or your firm[2] in the conceptual or actual design, construction, or operation and maintenance of any projects in the West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection project, St. Charles, St. John the Baptist, Ascension and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/Environmental Impact Statement and related projects.
- Current employment by USACE.
- Previous and/or current involvement with paid or unpaid expert testimony related to the West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection project, St. Charles, St. John the Baptist, Ascension and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/Environmental Impact Statement.
- Previous and/or current employment or affiliation with members of the cooperating agencies or local sponsors: Louisiana Department of Transportation and Development; Louisiana Department of Natural Resources; Louisiana Coastal Protection and Restoration Authority (for pay or *pro bono*).
- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse,

[1] Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "….when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

[2] Includes any joint ventures in which panel member's firm is involved and if the firm serves as a prime or as a subcontractor to a prime.

or children related to St. Charles, St. John the Baptist, Ascension or St. James parishes, Louisiana.

- Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the New Orleans District.
- Previous or current involvement with the development or testing of models that will be used for or in support of the West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection project, St. Charles, St. John the Baptist, Ascension and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/Environmental Impact Statement.
- Current firm[2] involvement with other USACE projects, *specifically* those projects/contracts that are with the New Orleans District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the New Orleans District.
- *Any* previous employment by the USACE as a direct employee, *notably* if employment was with the New Orleans District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- *Any* previous employment by the USACE as a contractor (either as an individual or through your firm[2]) within the last 10 years, *notably* if those projects/contracts are with the New Orleans District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning coastal storm damage reduction, flood control, or ecosystem restoration, and include the client/agency and duration of review (approximate dates).
- Pending, current, or future financial interests in the West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection project, St. Charles, St. John the Baptist, Ascension and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/Environmental Impact Statement and project-related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm[2] revenues within the last 3 years came from USACE contracts.
- A significant portion (i.e., greater than 50%) of personal or firm[2] revenues within the last 3 years from contracts with the non-Federal sponsor (Louisiana Department of Transportation and Development; Louisiana Department of Natural Resources; Louisiana Coastal Protection and Restoration Authority).
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to the West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection project, St. Charles, St. John the Baptist, Ascension and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/Environmental Impact Statement.
- Participation in relevant prior and/or current Federal studies relevant to this project and/or the West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection project, St. Charles,

St. John the Baptist, Ascension and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/Environmental Impact Statement.

- Previous and/or current participation in prior non-Federal studies relevant to this project and/or the West Shore-Lake Pontchartrain, Louisiana, Hurricane Protection project, St. Charles, St. John the Baptist, Ascension and St. James Parishes, Louisiana, Integrated Draft Feasibility Report/Environmental Impact Statement.
- Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project?

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. The six final reviewers either were affiliated with consulting companies or academic institutions or were independent consultants. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle made the final selection of the Panel. Section 4 of this report provides names and biographical information on the panel members.

3.3 Conduct of the IEPR

Prior to beginning their review and within 1 day of their subcontracts being finalized, all members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the WSLP-IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meetings, the Panel received an electronic version of the final charge as well as the WSLP-IEPR review documents and reference materials listed below.

This project was developed under the Specific, Measurable Attainable, Risk Informed, and Timely (SMART) Planning process. As such, the review documents were designated as "primary" and "supporting." The primary review documents, shown in bold font, were reviewed in their entirety by the panel members. The supplemental review documents were labeled as such because they were reviewed as needed by the individual panel members to locate back-up information, supporting statements, and conclusions.

- **WSLP IDFR/EIS (100 pages)**
- **Engineering Appendix (70 pages)**
- **Economics (40 pages)**
- **Real Estate (100 pages)**
- **Summary of Public Comments (7 pages)**
- Risk Register (3 pages)
- H&H Analysis (212 pages)
- Civil Design (130 pages)
- Geotechnical and Structural Engineering (580 pages)

- Cost Engineering (15 pages)
- USACE guidance Civil Works Review (EC 1165-2-214), dated 15 December 2012
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

In addition, throughout the review period, USACE provided the following documents at the request of panel members. These documents were provided to Battelle and then disseminated to the Panel as additional information only and were not part of the official review.

- Relative Sea Level Rise IAW EC-1165-2-212, for the Lake Pontchartrain at West End (85625)
- 2013-07-01 Final Array Alignment with Labels 34 by 44

About half-way through the review of the WSLP-IEPR review documents, a teleconference was held with USACE, the Panel, and Battelle so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 15 panel member questions to USACE. USACE was able to provide responses to most of the questions during the teleconference; the remaining panel member questions required additional coordination within USACE and were addressed by September 25, 2013.

3.4 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response table provided by Battelle. At the end of the review period, the Panel produced individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. As a result of the review, Battelle summarized the individual comments into a preliminary list of 25 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

3.5 IEPR Panel Teleconference

Battelle facilitated a 4-hour teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of high-level importance to the findings, and merged any related individual comments. In addition, Battelle confirmed each Final Panel Comment's level of significance to the Panel.

At the end of these discussions, the Panel identified 20 comments and discussion points that should be brought forward as Final Panel Comments.

3.6 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the WSLP-IEPR:

- Lead Responsibility: For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- Directive to the Lead: Each lead was encouraged to communicate directly with the other panel member as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:
  1. Comment Statement (succinct summary statement of concern)
  2. Basis for Comment (details regarding the concern)
  3. Significance (high, medium, low; see description below)
  4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
  1. High: Describes a fundamental problem with the project that could affect the recommendation, success, or justification of the project. Comments rated as high indicate that the Panel analyzed or assessed the methods, models, and/or analyses and determined that there is a "showstopper" issue.
  2. Medium: Affects the completeness of the report in describing the project, but will not affect the recommendation or justification of the project. Comments rated as medium indicate that the Panel does not have sufficient information to analyze or assess the methods, models, or analyses.
  3. Low: Affects the understanding or accuracy of the project as described in the report, but will not affect the recommendation or justification of the project. Comments rated as low indicate that the Panel identified information (tables, figures, equations, discussions) that was mislabeled or incorrect or data or report sections that were not clearly described or presented.
  - Guidance for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is

needed).

During the Final Panel Comment development process, the Panel determined that one of the Final Panel Comments could be merged with another Final Panel Comments; therefore, the total Final Panel Comment count was reduced to 19. Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, 19 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in Appendix A of this report.

4. PANEL DESCRIPTION

Candidates for the Panel were identified from the LWRC Primary Panel, LWRC Candidate Pool, and Battelle's Peer Reviewer Database. An overview of the credentials of the six panel members and their qualifications in relation to the technical evaluation criteria is presented in Table 2. More detailed biographical information regarding each panel member and his or her area of technical expertise is presented in the text that follows the table.

Table 2. WSLP-IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Casavant	Loomis	Crouch	Orr	Ellis	Spaulding
Civil Works Planning						
Minimum 10 years of experience in public works planning	X					
Direct experience working for or with USACE	X					
Familiar with USACE plan formulation process, procedures, and standards	X					
Familiar with USACE hurricane and coastal storm damage risk reduction projects	X					
Minimum 5 years of experience directly dealing with the USACE six-step planning process governed by Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook (USACE, 2000a)	X					
Experience identifying and evaluating impacts to environmental resources from structural flood risk management	X					
Experience identifying and evaluating impacts related to hurricane and coastal storm damage risk reduction projects	X					
Economics						
Minimum 10 years of experience directly related to water resource economic evaluation or review		X				

Table 2. West Shore IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Casavant	Loomis	Crouch	Orr	Ellis	Spaulding
Direct experience working for or with USACE		X				
Familiar with the USACE planning process, guidance, and economic evaluation techniques		X				
Familiar with the USACE hurricane and coastal storm damage risk reduction analysis and economic benefit calculations		X				
Familiar with the standard USACE computer programs, including Hydrologic Engineering Center-Flood Damage Reduction Analysis (HEC-FDA)		X				
Experience with the National Economic Development (NED) analysis procedures, particularly as they relate to hurricane and coastal storm damage risk reduction		X				
Active participation in related profession societies		X				
Minimum M.S. degree or higher in economics		X				
Biology/Ecology						
Minimum 10 years of demonstrated experience evaluating and conducting National Environmental Policy Act (NEPA) impact assessments, including cumulative effects analyses, for complex multi-objective public works projects with competing trade-offs			X			
Extensive background experience with and working knowledge of the implementation of the NEPA compliance process			X			
Experience working with NEPA impact assessment in marsh and urban areas and related ecosystem species and habitats			X			
Familiar with USACE calculation of evaluation of environmental benefits			X			
Knowledge of Endangered Species Act with regional knowledge of south Louisiana-specific regulatory requirements			X			
Minimum M.S. degree or higher in an appropriate field of study.			X			

Table 2. West Shore IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Casavant	Loomis	Crouch	Orr	Ellis	Spaulding
Hydrology & Hydraulic (H&H) Engineering						
Registered professional engineer with a minimum 10 years of experience in hydraulic engineering with an emphasis on large public works projects				X		
Familiar with USACE application of risk and uncertainty analyses in hurricane storm damage risk reduction studies				X		
5 to 10 years of experience working with numerical modeling applications for storm surge and wave analysis modeling and interior hydraulic modeling				X		
Familiar with standard USACE H&H computer models				X		
Active participation in related professional societies				X		
Minimum M.S. degree or higher in engineering				X		
Civil/Mechanical Engineering						
Registered professional engineer from academia, a public agency whose mission includes flood damage prevention, or an Architect-Engineer or consulting firm, having a minimum 15 years of experience in civil or mechanical engineering assessing hurricane storm damage risk reduction system projects					X	
Direct civil or mechanical engineering with regard to:						
a. levees					X	
b. floodwalls					X	
c. retaining wall					X	
d. pump stations					X	
e. gatewell structures					X	
f. utility penetrations					X	
g. stoplog and sandbag gaps and other closure structures					X	
h. interior drainage					X	

Table 2. West Shore IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Casavant	Loomis	Crouch	Orr	Ellis	Spaulding
i. drainage structures					X	
j. utility relocations					X	
k. non-structural measures					X	
Capable of addressing USACE Safety Assurance Review (SAR) aspects of all projects					X	
Active participation in related professional engineering and scientific societies					X	
Minimum BS degree in engineering					X	
Geotechnical/Structural Engineering						
Registered professional engineer from academia, a public agency whose mission includes flood damage reduction, or an Architect-Engineer or consulting firm, having a minimum 15 years of experience in soils engineering or related field						X
Familiar with geotechnical practices, as either a designer or construction project engineer, associated with hurricane and coastal storm damage risk reduction projects in southeastern Louisiana, including:						X
a. levees						X
b. floodwalls						X
c. retaining wall						X
d. pump stations						X
e. gatewell structures						X
f. utility penetrations						X
g. stoplog and sandbag gaps and other closure structures						X
h. interior drainage structures						X
Skillful with the USACE risk-informed approach to hurricane storm damage risk reduction system projects						X

Table 2. West Shore IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Casavant	Loomis	Crouch	Orr	Ellis	Spaulding
Capable of addressing USACE SAR aspects of all projects						X
Active participation in related professional societies						X
Minimum BS degree in engineering						X

Ken Casavant, Ph.D.

Role: Civil Works Planning
Affiliation: Independent Consultant

Dr. Casavant is a professor and agricultural economist at the School of Economic Sciences at Washington State University, Director of the Freight Policy Transportation Institute, and has served as an adjunct professor at North Dakota State's Upper Great Plains Transportation Institute since 2002. He earned his Ph.D. in economics from Washington State University in 1971 and has 45 years of experience as an economist, with expertise in transportation economics and planning. He has served as an economic consultant detailing the tradeoffs necessary on several public works projects, most recently on studies of the deep-draft national and international maritime industry.

Dr. Casavant also has over 10 years of experience in plan formulation and evaluation and comparison of alternative plans for numerous ecosystem restoration projects, navigation studies, and feasibility studies, including his technical reviews of the Lower Columbia River Channel Deepening Project, the Upper Mississippi and Illinois Navigation Study, the Barataria Basin Barrier Shoreline Restoration Study, and the Mississippi River Gulf Outlet Ecosystem Restoration Plan. Many of these studies included the assessment and sensitivity analyses of hurricane and coastal storm risk reduction projects, including the Donaldsonville to the Gulf project.

Over the last 7 years, Dr. Casavant has worked on more than 13 USACE projects affording him knowledge of a detailed and complete inventory of the USACE standards and procedures, including the IWR-Planning Suite methodologies, with a focus on ecological output per dollar of relevant expenditure for alternative project formulations. His experience with the USACE six-step planning process (governed by Engineer Regulation [ER] 1105-2-100, Planning Guidance Notebook [USACE, 2000a]) has been established from his work as a technical reviewer and peer reviewer on more than 20 projects. These include the Port of Iberia Channel Deepening Project in 2006 for USACE; the External Independent Economic Opinion on Identifying and Measuring NED Benefits: Navigation Shipping USACE, in 2007; and the Morganza to the Gulf IEPR study, a hurricane protection and storm damage risk project.

Dr. Casavant has experience identifying and evaluating impacts to environmental resources from

structural flood risk and impacts related to hurricane and coastal storm damage risk reduction projects. The six most recent projects he has contributed to had critical components concerning the impacts of environmental resources from flood risk and coastal storm damage. He has also been a plan formulator expert on five separate IEPRs; several of the projects had a specific objective to evaluate the damage reduction and the risk associated with achieving benefits of the flood risk management, and one project focused specifically on the impact to shorelines.

Dr. Casavant has published more than 70 journal articles and has contributed to hundreds of written documents including chapters in books; books; abstracts; proceedings; professional materials; conference papers; and research bulletins, circulars, and reports. He is a member of numerous professional associations, including the Transportation Research Board - National Research Council, the International Agricultural Economics Association, and the Logistics and Physical Distribution Association.

John Loomis, Ph.D.

Role: Economics
Affiliation: University of Colorado

Dr. Loomis is a professor of economics in the Department of Agricultural and Resource Economics at Colorado State University (CSU). He earned his Ph.D. in economics from CSU in 1983; has taught courses in economics at the University of California-Davis and CSU for more than 20 years; and has conducted economic water resources evaluations for over 30 years. His experience in public works planning includes teaching graduate-level courses in water resource economics; authoring a book on environmental policy analysis for decision-making; and serving for 3 years as an economic reviewer for the USACE Upper Yuba River studies on reservoir management in California. In addition, he served as an economics reviewer for the Lower Colorado River Authority San Antonio Water System, Texas, transbasin water public project to move water from the Lower Colorado River to the city of San Antonio. He also served as a consultant for the State of Utah economic benefits of public works projects to improve water quality in rivers and lakes. He has direct experience working for USACE and is familiar with USACE planning process, guidance, and economic evaluation techniques. Dr. Loomis was an economic instructor for USACE Waterways Experiment Station (WES) training courses for USACE employees. In addition, he was an USACE contractor on the Lower Snake River dam removal feasibility study and EIS and has served as an economist on four Battelle-led USACE IEPRs: two flood control projects (Donaldsonville to the Gulf and Morganza to the Gulf); one coastal storm damage reduction project (Surf City and North Topsail Beach, North Carolina); and one water management and reallocation project (Chatfield Storage Reallocation Study, Colorado).

Dr. Loomis's experience with USACE related to hurricane and coastal storm damage reduction projects includes the two New Orleans District flood control IEPR projects (Donaldsonville and Morganza) and his significant experience with USACE procedures for calculating flood damages. In addition, he has experience with hurricane and flood risk management analysis and benefit calculations on damage avoided and property values, and he is familiar with USACE computer programs such as the Hydrologic Engineering Center-Flood Damage Reduction Analysis (HEC-FDA) model, the content-to-structure value ratios (CSVRs) method, and

spreadsheet analysis. This experience, in part, related to working on Donaldsonville to the Gulf, Morganza to the Gulf, and Surf City IEPRs. Dr. Loomis has demonstrated experience in National Economic Development (NED) analysis procedures related to flood risk management, coastal storm damage reduction, and economic benefit calculations. His economic courses for USACE-WES related directly to the NED procedures presented in US Water Resources Council Economic and Environmental Principles and Guidelines. He also included NED benefit calculations (benefit-cost ratios, net present value, discounting) in his CSU Water Resource Economics course. Dr. Loomis is an active member of relevant professional societies.

Dr. Loomis served as Associate Editor for the Water Resources Research journal. He is currently associate editor for the American Journal of Agricultural Economics and co-editor of the Association of Environmental and Resource Economists Newsletter. He also served as an elected officer for the Association of Environmental and Resource Economists.

Kay Crouch

Role: Biology/Ecology
Affiliation: Crouch Environmental Services, Inc.

Ms. Crouch is president of Crouch Environmental Services, Inc., a company specializing in National Environmental Policy Act (NEPA) analysis, environmental site assessment, permitting, and mitigation for projects with high public and interagency interests. She earned her M.S. in biology/ecology in 1978 from Steven F. Austin State University and has received additional academic training in the NEPA process from the Duke University Nicholas School of Environmental and Earth Sciences (2004-2005). Ms. Crouch has 35 years of nationwide experience in conducting environmental site assessments and NEPA impact assessments for complex multi-objective public works projects with competing trade-offs. She has performed numerous environmental evaluations throughout the coastal ecosystems of Louisiana and Texas in support of Federal Energy Regulatory Commission (FERC) filings and NEPA documentation. For the first 10 years of her consulting career, Ms. Crouch worked predominantly in Louisiana performing NEPA analyses for oil and gas pipelines crossing the Louisiana Coastal Zone and has prepared over 100 NEPA documents since 1978.

Ms. Crouch has experience working with NEPA impact assessment in marsh and urban areas and related ecosystem species and habitats. She has worked extensively in the coastal marsh habitats that span the Gulf Coast. She has experience in high and low tidal marsh restoration and evaluation, as well as inland wetlands. She has also worked on projects in Louisiana involving evaluation of chenieres and inland swamps. In the mid-1990s, Crouch Environmental Services Inc. designed and constructed the Baytown Nature Center, Texas, a large coastal marsh creation project for which the company received the 1998 Award of Excellence from the National Association of Landscape Architects.

Ms. Crouch is familiar with USACE calculations of environmental benefits and routinely performs cumulative effects analyses on high-visibility public works projects as part of her extensive NEPA practice. This type of modeling has been required on every flood damage reduction and ecosystem restoration project she has worked on relating to USACE, including Clear Creek, Addicks and Barker Dams and Reservoirs. Additionally, she has experience serving

as an environmental expert in previous IEPRs of USACE projects. She has knowledge of the Endangered Species Act – specifically, with the listed species found in Southern Louisiana, including state-listed species through her work in the Louisiana coastal zone and previous IEPR review. Ms. Crouch is a member of the Society of Wetland Scientists.

Michelle Orr, P.E.

Role: H&H Engineering
Affiliation: Environmental Science Associates

Ms. Orr is Director of the Wetlands & Estuaries Group at Environmental Science Associates. She earned her M.S. in water resources engineering from the University of California, Berkeley in 1995 and is a licensed professional civil engineer in California. She has a background in coastal and riverine hydraulics and 20 years of experience in completing flood studies and integrating flood management with habitat restoration. She has worked in California, Oregon, Washington, Louisiana, and Florida, with particular experience in the San Francisco Estuary. She recently led the environmental and engineering services for the South Bay Salt Pond Restoration Project, which will restore over 15,000 acres of wetlands and provide flood protection for 15 miles of shoreline in South San Francisco Bay. This project is the largest wetland restoration on the West Coast. Ms. Orr is a LWRC Primary Panel Member.

Ms. Orr is familiar with USACE application of risk and uncertainty analysis in flood risk management through her review of the South San Francisco Bay Shoreline Study uncertainty analysis and IEPR review for the Donaldsonville to the Gulf Flood Control Project Feasibility Scoping Report and Supporting Documentation. She has conducted studies that utilize components of the risk and uncertainty approach, such as identifying probability distributions for forcing events, identifying joint probabilities, and conducting multiple simulations for sensitivity assessment. She has education and experience in coastal storm damage risk reduction.

Ms. Orr regularly works with numerical modeling applications for storm surge and wave analysis modeling and interior hydraulic modeling. She has been responsible for numerous projects that use one-dimensional and two-dimensional hydrodynamic models (e.g., MIKE-11, MIKE-21, MIKE Flood, Delft3D, unTRIM) linked to wave modules to address circulation driven by tides, wind, and waves in coastal waters; model tidal and wave-driven sediment transport; and forecast coastal storm surge and flooding. She has also conducted numerous drainage analyses of flood-prone, low-lying areas behind flood protection levees, including numerical modeling of runoff, ponding/detention, and drainage by pumping and gravity flow through culverts. Through her education and project work, Michelle has worked extensively with H&H models approved for use by USACE, including HEC-River Analysis System (HEC-RAS), HEC-Hydrologic Modeling System (HEC-HMS), HEC-6, the MIKE suite of models, Delft3D, and ADCIRC. Ms. Orr has also served as the H&H expert on previous IEPRs.

Ms. Orr is actively engaged in the scientific and restoration communities through conference presentations and peer-reviewed publications.

Ralph Ellis, P.E., Ph.D.

Role: Civil/Mechanical Engineering
Affiliation: University of Florida

Dr. Ellis is an Associate Professor in the Department of Civil Engineering at the University of Florida (UF) specializing in civil engineering and construction engineering. He earned his Ph.D. in civil engineering from UF in 1989 and is a registered professional engineer (PE) in Florida. Dr. Ellis has over 35 years of combined experience in industry and academia. He has worked on large-scale civil engineering projects both regionally and internationally. His experience in industry (1973-1989) has included the design and construction of levees, pumping stations, piping, and other structures related to water control; construction of temporary and permanent sheet pile walls; and dewatering operations. Many of the projects involved floodwalls, retaining walls, gatewell structures, interior drainage systems and structures, and the application of stoplog, sandbag, and other closure techniques. Before joining UF, Dr. Ellis was president of the Hammer Corporation construction firm and Director of Projects for the FMI - Hammer Joint Venture. From 1975 to 1985, he directed Joint Venture operations in south Florida and Central America for U.S. government agencies, USACE, the U.S. Navy, and the Panama Canal Company. Many of these projects involved significant earthwork structures (including flood control structures) and marine construction activities. He also has been responsible for many projects involving utility relocations and penetrations and has conducted national research on utility relocations.

At UF, Dr. Ellis currently teaches senior design classes on the design of pumping stations and related control structures. He has also taught courses on pumping stations and has developed and taught earthwork levee construction methods (including related design concepts) and environmental protection planning. As a civil engineering professor, Dr. Ellis has maintained an up-to-date knowledge of (1) USACE risk and uncertainty analyses as they apply to hurricane storm damage and risk reduction studies; (2) hurricane and storm damage risk reduction design criteria requirements and storm drainage system and design; (3) the full range of non-structural measures available for flood risk reduction; and (4) Safety Assurance Review (SAR) aspects of USACE projects. As a result, he was selected to participate in several Louisiana coastal storm damage reduction and ecosystem restoration project IEPRs for USACE, assessing analyses associated with cost engineering and construction management. He also has participated in an IEPR for a SAR of an impoundment project in Palm Beach County, Florida.

Dr. Ellis is an active member of the American Society of Civil Engineers (ASCE). He was a member of the ASCE Committee on Critical Infrastructure, providing input on national infrastructure renewal issues (2009-2012), and was a director of the ASCE Education and Research Directorate (2003-2007).

Doug Spaulding, P.E.

Role: Geotechnical/Structural Engineering
Affiliation: Spaulding Consultants, Inc.

Mr. Spaulding is a Principal and geotechnical engineer with Spaulding Consultants, LLC, responsible for dam, levee, and floodwall design and inspection. He earned his M.S. in geotechnical engineering from Purdue University, and is a licensed PE in Wisconsin, Minnesota, Michigan, North Dakota, and Arkansas. He has over 45 years of experience in the design, evaluation, and inspection of water-retaining structures. During that time, he has provided geotechnical design services for flood control levees and embankments in a 10-state area, including Louisiana. His experience includes 10 years with USACE, where he served as Chief of the Levee and Channel Design Section for the St. Paul District. In that capacity, he managed the development of the Pembina levee project in North Dakota and provided geotechnical design services for over $200 million worth of local flood protection projects in Minnesota and North Dakota. The Pembina project and the Mankato and Winona flood control projects in Minnesota all included extensive sections of floodwall (both I-wall and T-wall configurations). In addition, for the Winona project, Mr. Spaulding supervised the evaluation of underseepage.

Mr. Spaulding's background includes evaluating the stability of levee sections founded on soft clay foundations. His experience also includes geotechnical design of cellular sheet pile structures, sheet pile tieback walls, conventional gravity walls, and pump stations founded on sand and soft clay deposits. He has provided design services for embankments using preload fills to strengthen underlying foundation deposits. He recently served as a consultant to evaluate the instability caused by a sanitary landfill founded on over 100 feet of soft lacustrine clay. All of the local flood control projects for which Mr. Spaulding has provided design services have involved at least several gatewells to accommodate gravity drainage.

Mr. Spaulding's experience also includes flood barrier penetrations related to pressurized water supply lines, communication cables, and other utility systems, including penetrations through impervious and pervious levee sections and true concrete flood barrier structures. He has designed ramp sections, aluminum stoplog closures, sandbag freeboard closures, and, in one case, a temporary earth levee section. He also has experience in geotechnical design considerations for ditches, interceptor drainage pipe systems, and ponding areas. For the Mankato project, one ponding area required construction of an embankment designed to allow overtopping under an extreme flood event without failure of the embankment.

Over the last 10 years, Mr. Spaulding has participated in over 75 Potential Failure Mode Analysis (PFMA) evaluations of USACE flood control dams and hydroelectric projects. As a FERC authorized facilitator of PFMA evaluations, Mr. Spaulding has directed over 50 evaluations for embankment dams, concrete gravity structures, and arch dam structures.

Mr. Spaulding has recently provided peer review services on two reaches of hurricane protection projects in the New Orleans area. In 2008, he peer-reviewed the geotechnical design of the New Orleans Group 1 to Group 3 pump stations. In 2010, Mr. Spaulding served on the IEPR team reviewing an upgrade of the seepage control system for the East St. Louis flood control project. This $190 million project included upgrades to seepage berms, relief well systems, and slurry

cutoff trenches. He also recently served on the IEPR evaluation team for the Pine Creek dam remediation in Oklahoma, assessing proposed methods to control internal embankment seepage around an existing conduit that had created large internal voids in the 50-year-old dam. Overall, in the last 4 years, Mr. Spaulding has served on five IEPR review panels dealing with local flood protection projects, dam remediation, dam replacement, and seepage control system upgrades. This experience has provided extensive background in USACE's SAR requirements. In addition, Mr. Spaulding has participated in extensive Section 408 review for the installation of a large hydroelectric project at a USACE flood control dam.

Mr. Spaulding is a lifetime member of the ASCE. He also is a member of the Minnesota Geotechnical Society, the National Hydropower Association, and the Construction Panel for the Minneapolis section of the American Arbitration Association.

5. SUMMARY OF FINAL PANEL COMMENTS

The panel members agreed among one another on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012a; p. D-4) in the WSLP-IEPR review documents. Table 3 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Appendix A of this report. The following summarizes the Panel's findings.

The Panel agreed that the WSLP-IEPR review documents and appendices are well-written and concise; the Panel recognizes that the Specific Measurable Attainable Risk Informed Timely (SMART) Planning approach was applied to this study by USACE and appreciates the efficiency and clarity with which the project information was presented, in accordance with this approach. While the Panel believed that the main points were presented clearly, it identified areas where additional documentation and clarification is warranted.

Civil Works Planning – The Panel found that the process used to select the recommended alternative was rational and conducted in a reasonable manner; however, data sources, analytical findings, and references associated with the development and the analyses of project alternatives are not well-documented. This information is important to provide, especially for projects developed within the parameters of the SMART Planning framework. The Panel believes this issue can be addressed by adding references and summaries of the analyses underlying the IDFR/EIS to understand the development and costing of the project and the plan selection process.

The Panel noted that the IDFR/EIS does not describe the process for verifying key assumptions, nor does it explain how the plan formulation process will be iterated in response to any changes in key assumptions and how the Tentatively Selected Plan (TSP) may be affected. This concern can be addressed by reviewing the list of uncertainties for completeness, identifying which uncertainties will be addressed during further feasibility assessment, and explaining how the plan formulation process will be iterated in response to any changes in key assumptions.

Engineering – Although the technical analyses supporting the report are very preliminary and will require extensive refinement and additions during the development of the feasibility-level report, the studies to date adequately support the evaluation of alternatives and the selection of

Alternative C as the TSP. The civil design is based upon a clear understanding of the project objectives and appropriate design criteria. The Panel noted, however, that the absence of geotechnical site data creates significant uncertainty with regard to the soil conditions to be encountered for the TSP, and that the need to acquire this missing information early in the subsequent design phase is not addressed. Without a complete assessment of high-level geotechnical engineering activities that are required during the design phase, the cost comparison across alternatives could be affected; however, the project's technical feasibility is not likely to be affected. This issue can be addressed by including a discussion in the IDFR/EIS acknowledging the need to obtain additional borings for the Alternative C alignment.

The Panel noted that a plan for the disposal of excavated fill materials from the drainage channel is not incorporated into the proposed design. The accuracy cost estimate, real estate requirements and the potential environmental impacts of the project cannot be verified or understood without including a disposal plan for excavated material in the design. This documentation issue can be addressed by refining the interior drainage analysis to verify the required size of the drainage channel, developing a plan to dispose of excavated material and including a discussion of the plan in the IDFR/EIS, conducting appropriate stability analyses to validate on-site disposal options, modifying cost estimates, and revising the assessment of environmental impacts to reflect the adopted disposal plan.

In addition, the Panel found that the preliminary assessment of flood impacts does not allow for a full evaluation of potentially induced flooding, and flood mitigation measures that may need to be implemented are not identified. The level of flood analysis completed to date is not sufficiently refined to determine whether induced flooding will occur inside or outside of the proposed levee. The Panel recommends using ADCIRC and STWAVE to simulate the TSP, completing detailed rainfall-runoff modeling of the TSP, and including examples of feasible on-site and off-site flood mitigation measures as part the TSP.

Economics – The Panel acknowledges that the stated goals of Planning Objectives 2 and 5 as identified in the IDFR/EIS are to reduce risk to residents' lives and to reduce risk of damage and loss of critical infrastructure. However, it is difficult to assess the degree to which the residual risks (e.g., from levee overtopping or levee failure) under each alternative have been reduced because the residual risk has not been quantified. This issue can be addressed by performing a quantitative analysis of the residual risk to residents' lives and to evacuation infrastructure under each alternative.

The Panel believes that the incremental economic analysis of the benefits and costs of each separable non-structural element is needed at this stage in the planning process to ensure that the comparison of alternatives identifies the TSP with the highest net benefits possible. An economic evaluation of the separable non-structural measures will improve the defensibility of the analysis and support the determination of the National Economic Development (NED) plan and TSP. This can be accomplished by performing a reach-by-reach comparison of the monetary benefits and costs of the non-structural measures and iterating on plan formulation steps as needed to verify or revise the selection of the NED plan and TSP. Furthermore, without the assurance that necessary non-structural measures will be implemented over the 50-year time period, there is no longer equivalence of risk reduction and, hence, no longer equivalence in the benefits of Alternatives A, C, and D over the 50-year time period. In this case, an economic analysis cannot

rely solely on a comparison of costs across alternatives. The Panel recommends that for each alternative, the benefits and costs that are equally certain and under the control of USACE be calculated, without relying on the actions of local entities to achieve equal benefits across alternatives.

Environmental – The Panel believes that the results of the environmental analysis are technically sound at this point in the project, but the analysis could be strengthened by elaborating on some key issues. The Panel noted that the cumulative effects analysis does not consider other past, present, and future projects in the region and does not provide the degree of detail necessary to comply with National Environmental Policy Act (NEPA) requirements. The report would benefit from a comprehensive list and description of reasonably foreseeable future actions and activities (based on known future projects, and past/predictable development patterns) that are anticipated to occur in the project area. It would also be useful to include a discussion, in concert with SMART Planning, of the forecasted positive and negative cumulative effects that the TSP may have on those activities. The potential effects of climate change on the TSP do not appear to have been considered; this issue can be addressed by describing the potential effects of climate change and how these potential effects were considered during the plan formulation process. Additionally, a discussion of the rationale for selecting Alternative C as the TSP is also warranted to fully address the concerns expressed in the public comments.

Mitigation costs for direct and indirect habitat impacts are a large component of the relative cost difference between alternatives. Should wetlands impacts prove to be larger than estimated and mitigation costs higher than predicted, the selection of the TSP may require re-evaluation. This component of risk and uncertainty is not discussed, but this issue could be addressed by discussing the current understanding of hydrology associated with the TSP, the qualitative nature of the wetlands assessment, the margin of error assumed, and future studies that are planned to more quantitatively and thoroughly evaluate all wetlands effects resulting from the TSP.

Table 3. Overview of 19 Final Panel Comments Identified by the WSLP-IEPR Panel

1	A plan for disposal of the large volume of excavated fill materials from the drainage channel is not incorporated into the proposed design, and the many factors associated with the disposal of excavated material that could increase project costs and environmental impacts are not addressed.
2	The process for verifying key assumptions and the potential effects of this process on the future development of the Tentatively Selected Plan (TSP) are not explained.
3	The separable non-structural elements of Alternatives A and C have not been shown to be economically feasible.
4	
5	The residual risk to life (e.g., from levee overtopping or levee failure) and infrastructure of the alternatives has not been quantified.
6	
7	The economic analysis, which uses the percent reduction in damages for the top 10 damage reaches to extrapolate to the remaining reaches and to the year 2070, is not consistent with statistical principles.
8	
9	Data sources, analytical findings, and references associated with the development and the analysis of project alternatives are not well-documented.
10	The cumulative effects analysis does not consider other past, present, and future projects in the region, as required by the National Environmental Policy Act (NEPA).
11	Wetland impact assessment is preliminary; therefore, mitigation costs associated with the impacts are uncertain, which may affect the selection of the Tentatively Selected Plan (TSP).
12	

Table 3. Overview of 19 Final Panel Comments Identified by the WSLP-IEPR Panel (continued)

13	The basis for selecting the 100-year-flood level of protection is not provided and therefore could not be evaluated.
14	The proposed use of flap gates to provide closure under high water conditions may not be compatible with the safety or reliability requirements associated with an urban flood barrier.
15	The use of adaptability for future levee expansion as a criterion in plan formulation and alternatives evaluation is not fully described.
16	A well-defined description of the planned construction procedures is not provided; therefore, the reasonableness of the cost estimate and the technical feasibility of the design cannot be determined.
17	Potential impacts from climate change, while referred to in the documentation, are not described or analyzed in accordance with U.S. Army Corps of Engineers (USACE) policy.
18	The intermediate relative sea level rise (RSLR) scenario is presented inconsistently throughout the project documents.
19	Project operations with the intermediate scenario of relative sea level rise (RSLR) and project adaptability to higher than the intermediate scenario of RSLR are not described.

6. REFERENCES

40 CFR 1508.7. Code of Federal Regulations, Title 40: Protection of Environment. Chapter V: Council on Environmental Quality, Part 1508.7, Cumulative Impact.

Brekke, L.D., Kiang, J.E., Olsen, J.R., Pulwarty, R.S., Raff, D.A., Turnipseed, D.P., Webb, R.S., and White, K.D. (2009). Climate change and water resources management—A federal perspective: U.S. Geological Survey Circular 1331, 65 p. Available online at http://pubs.usgs.gov/circ/1331/.)

OMB (2004). Final Information Quality Bulletin for Peer Review. Executive Office of the President, Office of Management and Budget, Washington, D.C. Memorandum M-05-03. December 16.

The National Academies (2003). Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports. The National Academies (National Academy of Science, National Academy of Engineering, Institute of Medicine, National Research Council). May 12.

USACE (2013). Responses to Climate Change. U.S. Army Corps of Engineers website dated January 14, 2013. Available at www.corpsclimate.us/. Accessed September 13, 2013.

USACE (2012a). Water Resources Policies and Authorities: Civil Works Review. Department of the Army, US Army Corps of Engineers, Washington, D.C. Engineer Circular (EC) No. 1165-2-214. December.

USACE (2012b). Climate Change Adaptation Plan and Report. U.S. Army Corps of Engineers. June.

USACE (2011a). Fargo Moorhead Metropolitan Area Flood Risk Management Feasibility Report and Environmental Impact Statement. U.S. Army Corps of Engineers, St. Paul District. April.

USACE (2011b). Sea-Level Change Considerations for Civil Works Programs. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Circular (EC) No. 1165-2-212. October.

USACE (2007). External Independent Economic Opinion on Identifying and Measuring NED Benefits: Navigation Shipping.

USACE (2000a). Planning Guidance Notebook. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Regulation (ER) No. 1105–2–100. April.

USACE(2000b). Design and Construction of Levees. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Manual (EM) No. 1110–2–1913. April.

This page is intentionally left blank.

APPENDIX A

Final Panel Comments

on the

WSLP-IEPR

This page is intentionally left blank.

Final Panel Comment 1

A plan for disposal of the large volume of excavated fill materials from the drainage channel is not incorporated into the proposed design, and the many factors associated with the disposal of excavated material that could increase project costs and environmental impacts are not addressed.

Basis for Comment

The alignment and cross-sections shown for each alternative, including the Tentatively Selected Plan (TSP), show a drainage canal section located on the landward side of the flood barrier. As described in Section 5.1 of the Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS), this canal will have an invert of -10 NAVD88 and would be located a minimum of 50 feet landward from the levee section (Eustis Geotechnical Report). The quantity and cost spreadsheet for the TSP indicates a volume of 2.8 million cubic yards of dredging attributable to excavation of the drainage canal. The means of disposal of this large volume of excavated material are not described in the IDFR/EIS or the proposed design. The following potential disposal options increase both estimated projects costs and impacts:

1. **Haul Off-Site** – If the excavated material is hauled off-site, a disposal area of at least several hundred acres will be required. The cost of hauling the material off-site would also significantly increase the excavation cost, which is currently estimated to be $6 per cubic yard.
2. **Place Adjacent to the Canal** – If the excavated material is placed in piles adjacent to the canal section, additional land that is not identified in the proposed design will be required. The disposal piles will also create additional environmental impacts and significant stability issues for both the levee and the canal slopes. Based on the weak foundation deposits that are likely present in the project area, the stability issues for the excavated channel slope and adjacent spoil piles could be more critical than for the levee section.
3. **Use for Levee Fill** – The use of excavated material for levee fill may not be feasible or economical due to the characteristics and wetness of the excavated material.

Options 1 and 2 would require additional project lands, which in turn would create additional costs and environmental impacts associated with the use of either wetland or upland areas for disposal of excavated material. The disposal of excavated material for the U.S. Army Corps of Engineers (USACE) Fargo-Moorhead Diversion project in Minnesota and North Dakota (USACE, 2011a) is a major factor driving both project costs and environmental impacts. The disposal of excavated material raises similar concerns for the West Shore-Lake Pontchartrain project.

Significance – Medium

The accuracy cost estimate, real estate requirements and the potential environmental impacts of the project cannot be verified or understood without including a disposal plan for excavated material in the design.

Recommendations for Resolution

1. Refine the interior drainage analysis to verify the required size of the drainage channel.
2. Develop a plan to dispose of excavated material and add a discussion of the plan to the IDFR/EIS.
3. Conduct appropriate stability analyses to validate on-site disposal options.
4. Modify cost estimates and revise the assessment of environmental impacts to reflect the adopted disposal plan.

Literature Cited:

USACE (2011a). Fargo Moorhead Metropolitan Area Flood Risk Management Feasibility Report and Environmental Impact Statement. U.S. Army Corps of Engineers, St. Paul District. April.

Final Panel Comment 2

The process for verifying key assumptions and the potential effects of this process on the future development of the Tentatively Selected Plan (TSP) are not explained.

Basis for Comment

The Specific, Measurable Attainable, Risk Informed, and Timely (SMART) Planning process makes decisions informed by managing risk and acknowledging uncertainty. Data collection, analysis, and reporting are focused on providing only the information needed to make feasibility-level decisions. Consistent with the SMART Planning process, uncertainties are identified in Chapter 5, Section 5.1.5, of the Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS), and it is noted that risk and uncertainty will be further considered during subsequent feasibility-level analysis.

The following uncertainties are described:

- Environmental factors: relative sea level rise and size and frequency of storm events
- Engineering factors: levee/structure failure and induced flooding
- Economic factors
- Implementation factors related to the non-structural components

Elsewhere in the document, impacts to wetlands and associated mitigation costs are identified as highly uncertain at this stage in the study. These are not included in the list of uncertainties summarized in Chapter 5 of the IDFR/EIS.

The document does not describe the process for verifying key assumptions during further feasibility analysis, how the plan formulation process will be iterated in response to any changes in key assumptions, and how the TSP may be affected. The document does mention very briefly (IDFR/EIS, p. 5-5) that further evaluation of the non-structural components may reduce the number of structures that would be included in the TSP.

The document does not mention other possible changes to the TSP that may be required. For example, changes may be needed to mitigate off-site flood impacts or to reduce wetland impacts. Regarding potential off-site flood impacts, no specific mitigation measures are mentioned or shown to be feasible. Further wetland impact analysis may reveal greater-than-assumed impacts and associated mitigation costs, which could change the relative cost effectiveness of the alternatives and favor selection of an alternative with fewer wetland impacts. The range of potential changes to the TSP is not clear.

Significance – Medium

Potential changes to the TSP as a result of further feasibility analysis are not explained and therefore not understood.

Recommendations for Resolution

1. Review the list of uncertainties summarized in Chapter 5 of the IDFR/EIS for completeness, add to the list as needed, and identify which uncertainties will be addressed during further feasibility assessment.
2. Describe the process for verifying key assumptions once the feasibility analysis is complete and explain how the plan formulation process will be iterated in response to any changes in key assumptions.
3. Describe or elaborate on how the TSP may be affected by the results of further feasibility analysis.
4. Use the information from Recommendations 1-3 in subsequent communication of risk to the U.S. Army Corps of Engineers, stakeholders, and the public.

Final Panel Comment 3

The separable non-structural elements of Alternatives A and C have not been shown to be economically feasible.

Basis for Comment

The benefits and costs of a stand-alone non-structural plan are evaluated in the Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS); however, the evaluation apparently did not include reach-level detail. The costs of the stand-alone non-structural plan in its entirety were found to far exceed the benefits (IDFR/EIS, p. 3-4); therefore, the stand-alone non-structural plan was dropped from further consideration.

However, it is stated (IDFR/EIS, p. 3-4) that non-structural elements were added to Alternative A and to the Tentatively Selected Plan (TSP) (Alternative C) to provide the same level of storm-surge risk reduction as Alternative D (which requires no non-structural measures). This plan formulation facilitates the comparison of alternatives, but it appears to leave a step of the plan formulation process incomplete at this stage of the feasibility study.

In order to maximize net benefits when conducting a benefit-cost analysis, the separable features of a project are to be evaluated to ensure that the benefits of the separable features exceed their costs. The separable non-structural elements were included in Alternative A and Alternative C (the TSP), though the economic feasibility of these separable elements had not yet been established.

The IDFR/EIS (p 3-5) states that the economic feasibility of non-structural elements will be determined by reach during the subsequent feasibility-level design study. The reason for deferring this part of the economic analysis is not provided. The costs of the non-structural measures were included in the costs of Alternatives A and C (IDFR/EIS, p. 3-10, Table 3-3; Economic Appendix D, p. 26). However, the incremental benefits of these non-structural measures are not reported, so the Panel could not assess whether their benefits exceed their costs. The Panel understands that the Hydrologic Engineering Center-Flood Damage Reduction Analysis (HEC-FDA) model should be able to calculate the damages avoided (i.e., the primary benefits) from the non-structural measures. The Panel believes that the incremental economic analysis of the benefits and costs of each separable non-structural element is needed at this stage in the planning process to ensure that the comparison of alternatives identifies the TSP with the highest net benefits possible.

Significance – Medium

An economic evaluation of the separable non-structural measures contained in Alternatives A and C will improve the defensibility of the analysis and support the determination of the National Economic Development (NED) plan and TSP.

Recommendations for Resolution

1. Perform a reach-by-reach comparison of the monetary benefits and costs of the non-structural measures and iterate on plan formulation steps as needed to verify or revise the selection of the NED plan and TSP.

Final Panel Comment 4

The assumption that the benefits are equivalent for Alternatives A, C, and D is not supported due to the potential differences in risk reduction across alternatives arising from the uncertainty of the implementation of non-structural measures.

Basis for Comment

The Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS) states (pp. 3-6 and 3-11) that Alternatives A, C, and D are assumed to provide equal levels of risk reduction. This assumption is the basis for assuming equal benefits across the alternatives in Table 3-5 (p. 3-12). However, with respect to Alternative C, the IDFR/EIS states (p. 4-6): "It is anticipated that local parish building codes would place restrictions on the elevation of future construction in the area where non-structural acquisition or raising in place is necessary."

This assumption appears to be made to justify equal risk reduction, and hence equal benefits, of Alternatives C and D. However, differences in risk reduction could arise because the implementation of non-structural measures is uncertain.

The Economics Appendix D (pp. 25- 26) states that for "… Alternatives A and C to provide the same benefits, structure raisings or acquisitions will be offered in the area not receiving risk reduction by structural measures".

The costs of the non-structural measures associated with each alternative were included. However, households may not take the offer for acquisition, or they may not participate in structural raisings, since homeowners would have to bear some portion of the cost to raise their structure.*****

Without assurances that the necessary non-structural measures will be implemented over the 50-year time period, there is no longer equivalence of risk reduction and, hence, no longer equivalence in benefits of Alternatives A, C, and D over the 50-year time period. Therefore, the economic analysis cannot rely solely on a comparison of costs across alternatives.

Significance – Medium

The economic justification for selecting Alternative C as the Tentatively Selected Plan hinges on the assumption of equal benefits across alternatives, which may be invalid.

Recommendations for Resolution

1. For each alternative, calculate the benefits and costs that are equally certain and under the control of the U.S. Army Corps of Engineers (USACE), without relying on the actions of other local entities to achieve equal benefits across alternatives.

***** *The Panel was informed of this requirement during a September 12, 2013, teleconference with USACE and Battelle.*

Final Panel Comment 5

The residual risk to life (e.g., from levee overtopping or levee failure) and infrastructure under the alternatives has not been quantified.

Basis for Comment

Planning Objectives 2 and 5 identified in the Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS) (p. 1-6) are to reduce risk to residents' lives and to reduce risk of damage and loss of critical infrastructure (especially the I-10/I-55 hurricane evacuation route). However, it is difficult to assess the degree to which the residual risks under each alternative have been reduced because the residual risk has not been quantified. In particular, the following statements indicate that there is still significant residual risk to life and infrastructure under Alternatives A and C:

- The IDFR/EIS (p. 3-7) indicates that Alternative A has the greatest residual risk of levee overtopping that would immediately inundate populated areas.
- The IDFR/EIS (p. 3-8) indicates that Alternative C has less residual risk than Alternative A because levee overtopping would not immediately inundate populated areas. However, Alternative C does not reduce risk to infrastructure in St. James Parish.

Further, there is little documentation in the IDFR/EIS of how these residual risks to life and infrastructure were measured. The residual risks to life (probabilities of loss of life, number of people at risk) are not quantified across alternatives; therefore, the magnitude of differences in residual risk across alternatives cannot be identified, and any reduction in risks compared to the existing situation cannot be confirmed.
This quantitative residual risk information is important to the selection of the Tentatively Selected Plan (TSP) since reducing risks is the stated goal of Planning Objectives 2 and 5.

Significance – Medium

A quantitative analysis of residual risk is needed to assess how well the TSP meets the two risk-related planning objectives.

Recommendations for Resolution

1. Perform a quantitative analysis of the residual risk to residents' lives and to evacuation infrastructure under each alternative.

Final Panel Comment 6

The preliminary assessment of flood impacts does not allow for a full evaluation of potentially induced flooding, and flood mitigation measures that may need to be implemented are not identified.

Basis for Comment

The potential flood impacts of the alternatives are assessed in Section 4.1 of the Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS). However, as noted in Section 5.1 (p. 5-4), the level of flood analysis completed to date is not sufficiently refined to determine whether induced flooding will occur inside or outside of the proposed levee. For example:

- While Alternatives A, B, and D have been modeled using ADCIRC and STWAVE to assess potential storm surge elevations outside the levee (Appendix B: Engineering), the Tentatively Selected Plan (TSP) (Alternative C) has not been modeled. Additionally, where modeling results are available (for Alternatives A and D), these results are not described in the text. Storm surge modeling of Alternative D for the 100-year event indicates potential off-site water level increases of up to 0.8 foot outside the levee, west of Lake Maurepas (Figure 127 of the Storm Surge Frequencies memorandum). These values are not provided in the Environmental Consequences discussion (IDFR/EIS, Section 4.1.1).
- The potential for induced flooding inside the proposed levee has received only a rough-order-of-magnitude assessment (Appendix B: Engineering, .p. 8). No detailed rainfall-runoff analysis has been completed to date.

The project commits to “incorporate features to mitigate for any potential induced flooding” (IDFR/EIS, p. 5-4). However, no examples of feasible mitigation measures are presented.

Significance – Medium

The preliminary nature of the flood assessment affects the completeness of the IDFR/EIS, and the flood mitigation measures that may need to be implemented have not been demonstrated to be feasible.

Recommendations for Resolution

1. Use the models (ADCIRC and STWAVE) to simulate the TSP (Alternative C) and document the results.
2. Complete detailed rainfall-runoff modeling of the TSP and document the results.
3. Present examples of feasible on-site and off-site flood mitigation measures unless or until it has been shown that such mitigation measures are not needed.
4. Include any required flood mitigation measures in the description of the TSP.

Final Panel Comment 7

The economic analysis, which uses the percent reduction in damages for the top 10 damage reaches to extrapolate to the remaining reaches and to the year 2070, is not consistent with statistical principles.

Basis for Comment

The Hydrologic Engineering Center-Flood Damage Reduction Analysis (HEC-FDA) model was used to quantify the damages to the top 10 damage reaches (Appendix D: Economics, p. 26). On the same page, it is stated that the 46% damage reduction for these reaches was extrapolated to the remaining 71 reaches.

Further, the 46% damage reduction calculated for the year 2020 was applied to all the reaches in the year 2070 with intermediate relative sea level rise.

Generalizing damage reduction from a sample of reaches to all the reaches requires that the sampled reaches be representative of the overall reaches.

Applying the percent damage reduction from the top 10 reaches in terms of percent damage reduction to the other 71 reaches may overstate the percent damage reductions realized in the other 71 reaches, but the degree of this overstatement is not known.

Significance – Medium

The economic feasibility of the alternatives and the selection of the Tentatively Selected Plan depend on an accurate measure of benefits.

Recommendations for Resolution

1. Apply the HEC-FDA model to calculate the damage reduction to each of the reaches in the years 2020 and in 2070.
2. Apply the HEC-FDA model to a random sample of the reaches, and extrapolate the resulting percentage damage reduction to all the remaining reaches, if it is not possible to calculate damage reduction to all reaches.

Final Panel Comment 8

The need to acquire additional borings for Alternative C during the feasibility-level design phase of the study, which could reveal different soil conditions from those assumed, is not acknowledged.

Basis for Comment

The absence of geotechnical site data for Alternative C (the Tentatively Selected Plan [TSP]) is acknowledged in the Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS), but the need to acquire this missing information early in the subsequent design phase is not addressed. The geotechnical site data for approximately one-half of the levee alignment for the TSP were extrapolated from soil boring reports taken in the general study area, but not within the proposed alignment. The absence of geotechnical data creates significant uncertainty with regard to the soil conditions to be encountered in this portion of the TSP. This is relevant because this risk occurs only in the TSP and not in the other alternatives. The actual conditions could be significantly different than those assumed, which could require design adjustment for the levee and possibly other structures in this area. If required, design modification could increase the cost of the levee construction in this section of Alternative C and influence the cost comparison of alternatives.

Significance – Medium

Without a complete assessment of high-level geotechnical engineering activities that are required during the next project phase, the cost comparison across alternatives could be affected, but a design modification is not likely to affect the project's technical feasibility.

Recommendations for Resolution

1. Include a discussion in the report acknowledging the need to obtain additional borings for the Alternative C alignment.

Final Panel Comment 9

Data sources, analytical findings, and references associated with the development and the analysis of project alternatives are not well-documented.

Basis for Comment

Significant analyses have been done in developing and evaluating the West Shore-Lake Pontchartrain (WSLP) project alternatives. However, it is important to provide information such as data sources, analytical findings, and references, especially for projects developed within the parameters of the Specific, Measurable Attainable, Risk Informed, and Timely (SMART) Planning framework, so that panel members and other reviewers can understand how the project was developed. In many cases, it appears that the information underlying the analyses is readily available. Selected examples of incomplete documentation include the following:

1) The rationale for the assumptions of models and alternative selection/evaluation is generally given, but data and sources are not provided in many instances. As a result, the assumptions appear unjustified.
2) The assertions and rationale regarding measures that were considered and eliminated are incompletely discussed, even under this risk-informed decision model.
3) The details of the scoring of alternatives (Integrated Draft Feasibility Report/Environmental Impact Statement [IDFR/EIS], pp. 3-4) are not explained, and it could not be determined how the total score was computed, other than that the alternatives were scored on how well they met the objectives and avoided constraints. The IDFR/EIS also does not identify the party responsible for scoring the alternative plans or explain how the objectives and constraints factored into the scoring process. Such information and documentation is needed to understand the reasonableness of this process.
4) Four Federal accounts were used to facilitate comparison of the alternatives; however, the source of these accounts is not provided. It appears the accounts may have come from the U. S. Water Resources Council Principles and Guidelines.
5) There is an unstated assumption that the 30 residential structures and the 80 commercial structures used to estimate content-to-structure value ratios are geographically representative of the study area. However, no information is provided on how the sample was selected or which Parishes in the study area were represented.
6) The indirect impact costs are substantial and, while the development of high and low costs is a reasonable approach, no references for the documents used to develop the costs are provided. Therefore, it is not possible to understand, for example, why Alternative D, which encloses the greatest area of existing wetlands, has a range of habitat mitigation costs that extends below the ranges provided for the other alternatives (IDFR/EIS, p. 3-10).
7) The habitat reduction value impacts are based on available information that is not cited (IDFR/EIS, p. 3-10).

8) The reasonableness of the costs provided on p. 25 of the IDFR/EIS could not be determined because the referenced cost spreadsheet is not provided.

9) The basis for the real estate costs regarding the structural features and the non-structural buyouts is not provided. It appears that these costs may be based on the median value of owner-occupied housing units given in Section 2.3.6 (p. 2-14 of the IDFR/EIS), but no reference is provided.

10) Tables 17-19 and 21-23 in Appendix D, Economics, are presented with almost no explanation of the costs. For example, Tables 17 and 18 do not explain whether the $6 million in recurring costs are non-structural costs. These costs do not appear be associated with operations, maintenance, repair, rehabilitation, and replacement costs because they are absent from Table 19 (Alternative D).

11) The costs for the various alternatives (Table 3-3 of the IDFR/EIS) include allocations for indirect impact costs as described in the paragraph preceding the table (p. 3-9), but the overall reasonableness of the alternatives could not be determined because the cost data are not provided.

Significance – Medium

Supporting information and documentation of the analyses underlying the IDFR/EIS is required to understand the development and costing of the project and plan selection process.

Recommendations for Resolution

1. Provide references and summaries of data that support assumptions made, and provide documentation of the data collection efforts and analyses that have been undertaken, including the indirect and direct costs.

Final Panel Comment 10

The cumulative effects analysis does not consider other past, present, and future projects in the region, as required by the National Environmental Policy Act (NEPA).

Basis for Comment

Cumulative effects are defined by 40 CFR 1508.7 as: "The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions." Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

The primary purpose of the cumulative effects analysis in the NEPA process is to ensure that Federal decisions consider the full range of consequences. The range of actions that must be considered includes not only the project proposal but all connected and similar actions, public or private, that could contribute to cumulative effects. The following specific comments relate to the Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS) cumulative effects analysis:

1. Additional population and economic growth are possible consequences of implementation of the Tentatively Selected Plan (TSP). Potential positive and negative impacts associated with population and economic sector growth within the levee protection zone are not fully discussed. Additional economic activity, pressure on highway systems and on sewer and water capacity, and potentially greater flood damage losses and greater human health risks as a result of expected growth are examples of cumulative socioeconomic effects that have not been raised.
2. The description and analysis of cumulative effects do not adequately address the effects of other large projects planned in the region when combined with the potential effects of the TSP. Other large projects may compete for borrow materials and wetland mitigation sites, and may affect assumptions used in selecting the TSP. Other large projects may have synergistic beneficial effects when combined with the TSP or may have negative effects on the TSP. In particular, the cumulative effects of proposed diversion projects in the region have not been discussed in relation to the TSP. The project may affect the area of influence of the proposed Maurepas Swamp Diversions. The interaction of the proposed Hope Canal diversion with the proposed project levee is not described.
3. Cumulative effects of unrelated private actions, including actions that may adversely affect the TSP, are not described. These may include, but are not limited to, private development (residential, commercial, and industrial) and oil and gas and other energy activities. For example, activities requiring the creation of new canals within surrounding wetlands (including the planned mitigation sites) may have adverse effects on the federal investment.
4. Cumulative effects for wetlands losses and fish and aquatic resources are only minimally described. A brief but more thorough discussion of cumulative effects for these resources, considering all reasonable unrelated foreseeable future

scenarios, including climate change, is a requirement of NEPA.

Significance – Medium

The discussion of cumulative effects in the IDFR/EIS does not provide the degree of detail necessary to comply with NEPA requirements.

Recommendations for Resolution

1. Include a comprehensive list of reasonably foreseeable future actions (based on known future projects and past/predictable development patterns) that may be undertaken in the project area in the IDFR/EIS.
2. In concert with Specific, Measurable Attainable, Risk Informed, and Timely (SMART) Planning framework, in tabular form, briefly describe foreseeable activities that are anticipated to occur in the project area (e.g. other Federal projects, development infrastructure expansion, oil and gas exploration and production, diversion canal creation or expansion, pipeline system expansion and maintenance, and other similar activities common to the project area) and forecast cumulative effects, both positive and negative, that the TSP may have on those activities.
    a. Include the potential effects that those activities may have on the Federal investment in the TSP (both levee construction and mitigation). In particular, give greater attention to both positive and negative socioeconomic and ecological effects, including potential effects of climate change.
3. Briefly describe related flood damage reduction and restoration/mitigation projects anticipated to be performed under other authorities. Summarize their adverse and positive effects in combination with those anticipated for the TSP.
4. Briefly describe any measures anticipated to be implemented to mitigate adverse cumulative effects, including those that may be adverse to the Federal project.

Literature Cited:

40 CFR 1508.7. Code of Federal Regulations, Title 40: Protection of Environment. Chapter V: Council on Environmental Quality, Part 1508.7, Cumulative Impact.

Final Panel Comment 11

Wetland impact assessment is preliminary; therefore, mitigation costs associated with the impacts are uncertain, which may affect the selection of the Tentatively Selected Plan (TSP).

Basis for Comment

The assessment of wetland impacts at this stage of the study is preliminary and is based on data that are not field verified. Potential wetlands effects for areas interior to the proposed levee are unknown. Changes in hydrology and resulting effects on wetlands are estimated and uncertain. Habitat connectivity, fragmented by the proposed levee, is not described. This includes connectivity of wetlands, channels, and the overmarsh water column. The potential effects of introducing a corridor of higher ground into the wetlands are not discussed. The preliminary nature of the wetlands impact assessment is acknowledged in the Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS).

Operational elements of the TSP with respect to potential wetlands effects are not described. In particular, operation of sluice gates and their potential to reduce sediment delivery to wetlands (from the proposed Maurepas Swamp diversions, for example) is not evaluated.

Mitigation costs for direct and indirect habitat impacts are a large component of the relative cost difference between alternatives (IDFR/EIS Table 3-3, p. 3-10). Should wetlands impacts prove to be larger than estimated and mitigation costs higher than predicted, the selection of the TSP may require re-evaluation. This component of risk and uncertainty is not discussed.

It is noted that coordination with the Habitat Evaluation Team (HET) is ongoing.

Significance – Medium

The preliminary nature of the assessment of wetlands affects the completeness of the documentation and identification of risk and uncertainty.

Recommendations for Resolution

1. Describe in more detail the qualitative nature of the wetlands assessment, the margin of error assumed, and future studies that are planned to more quantitatively and thoroughly evaluate all wetlands effects resulting from the TSP.
2. Discuss in more detail the current understanding of hydrology associated with the TSP and what effects this could have on wetlands within the project area.
3. Expand the discussion of mitigation measures to compensate for more extensive wetlands effects, if any.
4. Describe ongoing coordination with the HET with respect to wetlands mitigation and compensation for habitat loss and fragmentation.
5. Discuss the operational elements of the TSP and potential effects on sediment

fate and transport with respect to wetlands in the project area.

6. Provide a more detailed discussion of wetlands mitigation costs, including the assumptions and uncertainties, and how uncertainties in the cost estimate may affect the evaluation of alternatives and the TSP.

Final Panel Comment 12

Public concerns have not been adequately identified and addressed.

Basis for Comment

Public comments were collected by the U.S. Army Corps of Engineers (USACE) at previous scoping and other public meetings. Additionally, the public comment period was extended past the time period the Panel was allotted to complete its review of the West Shore-Lake Pontchartrain project. While the Panel did not have access to all public comments received by USACE, a summary of the public comments was provided for review prior to the completion of the Final Independent External Peer Review Report.

The Panel noted a strong community preference for Alternative D stated in the public comments. Considering the arguments put forward by stakeholders for the selection of Alternative D over C, it appears that the decision to adopt Alternative C as the Tentatively Selected Plan (TSP) was not fully explained and may be perceived as unjustified by the community.

Significance – Medium

Additional discussion of the rationale for selecting Alternative C as the TSP is warranted to fully address the concerns expressed in the public comments.

Recommendations for Resolution

1. Describe more fully, perhaps in tabular or spreadsheet form, the public comments received during scoping, interim public meetings, and the recent comment period.
2. Provide additional discussion and explanation for the selection of Alternative C as the TSP in light of the public's preference for Alternative D.
3. Provide responses to the public's arguments put forward during the comment period for the selection of Alternative D.

Final Panel Comment 13

The basis for selecting the 100-year-flood level of protection is not provided and therefore could not be evaluated.

Basis for Comment

The Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS) and related evaluations focused almost entirely on a 100-year level of protection. There was no discussion related to greater degrees of protection requiring higher and longer flood barriers. It is likely that the construction of the proposed flood protection structures will increase the public's sense of security, which in turn will likely spur more development within the protected area. On previous U.S. Army Corps of Engineers urban flood protection projects, such as the Pembina local flood protection project in North Dakota, this type of increased hazard potential required upgrading the level of protection after the urban protection projects had been in place for almost 40 years. The Panel's experience with other urban flood protection projects throughout the United States indicates that a 100-year level of protection has been generally the lowest employed for local flood protection projects.

Significance – Low

Although the 100-year level of protection is a standard that has been adopted for other projects in the general area, a discussion of the rationale for selecting the 100-year level of protection would strengthen the report and increase the credibility of the evaluation of alternatives.

Recommendations for Resolution

1. Modify the IDFR/EIS to include a discussion of the rationale for using the 100-year level of protection for all alternatives.

Final Panel Comment 14

The proposed use of flap gates to provide closure under high water conditions may not be compatible with the safety or reliability requirements associated with an urban flood barrier.

Basis for Comment

Section 8.1 of the Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS) states that environmental control structures (culverts with flap gates) would be used for environmental control during flood events. The use of flap gates is also described in Section 3 related to Alternative A. The type of flap gates that would be employed for the Tentatively Selected Plan (Alternative C) was not specified. The use of non-automated flap gates is generally limited to agricultural levees rather than urban flood barriers. U.S. Army Corps of Engineers (USACE) guidance provided in Engineer Manual (EM) 1110 – 2 – 1913 (USACE, 2000b) indicates that gravity lines penetrating the levee should be controlled by slide gates where the rate of rise of water during major flood events is slow or predictable or by automated flap gates. The advantages of the slide gates are that they are more reliable than flap gates, even if the flap gates are automated. The USACE guidance also indicates that consideration should be given to supplemental means (secondary gate systems) to close gravity drainage lines that penetrate the levee.

Significance – Low

The use of flap gate closures may be inappropriate for the West Shore-Lake Pontchartrain project, and the added cost of utilizing automated slide gate closures instead would be very small.

Recommendations for Resolution

1. Evaluate the relative reliability of automated flap gate closure systems and slide gate closure systems in future design stages.

Literature Cited:

USACE(2000b). Design and Construction of Levees. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Manual (EM) No. 1110–2–1913. April 30.

Final Panel Comment 15

The use of adaptability for future levee expansion as a criterion in plan formulation and alternatives evaluation is not fully described.

Basis for Comment

Levees that can be readily widened, if needed, are more adaptable than those that can be widened only with the purchase and/or relocation of existing structures. Adaptability is used as an evaluation criterion, with Alternative A identified as the least adaptable as compared to Alternatives C and D (Integrated Draft Feasibility Report/Environmental Impact Statement [IDFR/EIR], p. 3-7).

A slightly modified version of Alternative A with a small offset from the developed edge would allow for adaptability while increasing wetland impacts by only the slightest amount. Such a modified version may perform better than Alternative A, but it does not appear to have been considered.

Alternatives A, C, and D each include a large canal on the inboard side that would appear to limit future expansion, and all appear equally expandable on the outboard side of the levee. Considering these similarities among the alternatives, and because the process used to evaluate the differences in adaptability between alternatives was not explained in the IDFR/EIS, it is not understood how the alternatives differ in adaptability.

Significance – Low

The limited nature of the discussion of adaptability affects the completeness of the IDFR/EIS.

Recommendations for Resolution

1. Clarify the importance of adaptability as an evaluation criterion.
2. Consider a modified version of Alternative A that provides for adaptability, or explain why such a modified version is not considered, if adaptability is an important criterion.
3. Provide a brief explanation of how differences in adaptability were evaluated between alternatives.

Final Panel Comment 16

A well-defined description of the planned construction procedures is not provided; therefore, the reasonableness of the cost estimate and the technical feasibility of the design cannot be determined.

Basis for Comment

Technical feasibility and estimated costs are directly influenced by the planned construction process. The Tentatively Selected Plan (Alternative C) involves constructing approximately 18 miles of earthen levee and drainage canal, with much of the alignment located in areas with soft foundation soil conditions. It is difficult to properly assess project feasibility without a discussion of the planned construction process and sequence that accounts for known obstacles that could impede the project schedule.

Significance – Low

A discussion of the planned construction process and sequence will improve the quality and clarity of the Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS).

Recommendations for Resolution

1. Add a discussion of the planned construction process and sequence to the IDFR/EIS.

Final Panel Comment 17

Potential impacts from climate change, while referred to in the documentation, are not described or analyzed in accordance with U.S. Army Corps of Engineers (USACE) policy.

Basis for Comment

(Note: The consideration of the relative sea level rise aspect of climate change on the West Shore-Lake Pontchartrain (WSLP) planning process is addressed in a separate Panel comment.)

While the potential effects of climate change on the Tentatively Selected Plan (TSP) are mentioned, climate change is not discussed as a discrete topic in the Integrated Draft Feasibility Report/Environmental Impact Statement (IDFR/EIS), and the process for incorporating the general effects of climate change into the planning process is not described in the WSLP project documentation. Recent guidance issued by USACE states the agency's intention to consider climate change as part of the planning process, as shown in the following excerpts: "Climate change impacts affect water availability, water demand, water quality, stormwater and wastewater infrastructure, flood and coastal storm infrastructure, wildland fires, ecosystem functioning, coastal zone functioning, navigation, and energy production and demand. All of these factors affect the water resources projects operated by the Corps and its non-Federal sponsors. Many of these were designed and constructed before climate change was recognized as a potential influence. "The entire portfolio of USACE Civil Works water resources infrastructure and programs, existing and proposed, could be affected by climate change and adaptation to climate change. This affects design and operational assumptions about resource supplies, system demands or performance requirements, and operational constraints. Both droughts and floods can affect the operations of these projects. Numerous regulatory decisions made by USACE will need to be informed by climate change impacts and adaptation considerations throughout the U.S., especially in western states." (USACE, 2013) "In response to a growing body of evidence about climate impacts to our missions and operations, we published a foundational report with other water resources agencies: *Climate Change and Water Resources Management: A Federal Perspective*. [2] Since that time, we have developed a governance structure to support mainstreaming adaptation by establishing an overarching USACE *Climate Change Adaptation Policy Statement and a Climate Change Adaptation Steering Council*. This policy requires USACE to mainstream climate change adaptation in all activities to help enhance the resilience of our built and natural water-resource infrastructure and reduce its potential vulnerabilities to the effects of climate change and variability." (USACE, 2012b)

Significance – Low

The IDFR/EIS may not comply with the USACE climate change adaptation policy because the potential effects of climate change are not discussed as a discreet topic.

[2] Brekke et al. (2009).

Recommendations for Resolution

1. Describe, briefly, the potential effects of climate change on the TSP as a discrete topic.
2. Discuss how the potential effects of climate change were considered during plan formulation and development.
3. Revise the EIS and the environmental summary in the IDFR/EIS to include this information.

Literature Cited:

Brekke, L.D., Kiang, J.E., Olsen, J.R., Pulwarty, R.S., Raff, D.A., Turnipseed, D.P., Webb, R.S., and White, K.D. (2009). Climate change and water resources management—A federal perspective: U.S. Geological Survey Circular 1331, 65 p. Available online at http://pubs.usgs.gov/circ/1331/.)

USACE (2013). Responses to Climate Change. U.S. Army Corps of Engineers website dated January 14, 2013. Available at www.corpsclimate.us/. Accessed September 13, 2013.

USACE (2012b). Climate Change Adaptation Plan and Report. U.S. Army Corps of Engineers. June 2012.

Final Panel Comment 18

The intermediate relative sea level rise (RSLR) scenario is presented inconsistently throughout the project documents.

Basis for Comment

The term “intermediate” RSLR is used to refer to two different scenarios. In Table 2-2 (Integrated Draft Feasibility Report/Environmental Impact Statement [IDFR/EIS], p 2-3), the term refers to the National Research Council (NRC) Curve I, in accordance with U.S. Army Corps of Engineers (USACE) Engineer Circular (EC) 1165-2-212 (2011b). On the same page, in Figure 2-2, the term refers to NRC Curve II (intermediate of the three NRC curves). The values differ by approximately 0.8 foot in the year 2070. It appears that the intermediate RSLR scenario used in the analysis corresponds with NRC Curve I.

Significance – Low

The inconsistent descriptions of “intermediate” RSLR affect document readability.

Recommendations for Resolution

1. Revise the document, including text, tables, and figures, for consistent presentation of the “intermediate” RSLR scenario.

Literature Cited:

USACE (2011b). Sea-Level Change Considerations for Civil Works Programs. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Circular (EC) No. 1165-2-212. October.

Final Panel Comment 19

Project operations with the intermediate scenario of relative sea level rise (RSLR) and project adaptability to higher than the intermediate scenario of RSLR are not described.

Basis for Comment

The U.S. Army Corps of Engineers (USACE) provides guidance for incorporating the effects of projected future sea-level change in project implementation (USACE, 2011b). The guidance states: "Planning, engineering, designing, operating, and maintaining for sea level change must consider how sensitive and adaptable 1) natural and managed ecosystems and 2) human and engineered systems are to climate change and other related global changes."

The West Shore-Lake Pontchartrain (WSLP) planning process identifies low, intermediate, and high rates of RSLR (Integrated Draft Feasibility Report/Environmental Impact Statement [IDFR/EIS], p. 2-3; Appendix B: Engineering) and models coastal storm surge for these three scenarios. The intermediate RSLR scenario was applied for the WSLP feasibility study (IDFR/EIS, p. 5-3).

The intermediate RSLR scenario is used to develop the design flood elevation. It is not clear whether the intermediate RSLR scenario is used in the operations plan, specifically regarding the closure frequency of the water control structures. The operations plan is based on an estimated closure frequency of 8.5 days per year, and there is no discussion of how this frequency may or may not increase under the assumed RSLR scenario. It is stated (IDFR/EIS, p. 4-18) that any impacts associated with more frequent closure due to RSLR would be analyzed and documented in a future supplemental National Environmental Policy Act document, implying that project operations have not considered RSLR.

Per USACE guidance, a description of how project benefits change under the low and high RSLR scenarios is provided (IDFR/EIS, p. 5-3). However, adaptability of the project to the high RSLR scenario is not discussed. Adaptation approaches could include, for example, raising levees and increasing pump capacities.

Adaptation requires monitoring or tracking the actual rate of RSLR during the design life of the project. A discussion of how the actual rate of RSLR will be monitored or tracked, or which agency will be responsible for monitoring or tracking, is not provided. It is also unclear how a higher RSLR scenario would be used by USACE or the local sponsor in adaptive management to consider future implementation of adaptation measures.

Significance – Low

The discussion of RSLR in the IDFR/EIS is incomplete and does not fully comply with USACE guidance.

Recommendations for Resolution

1. Evaluate average annual closure frequency with RSLR, summarize the results of this evaluation in the text, and revise the estimate of closure frequency in the text as needed.
2. Add text to discuss adaptability of the project to a higher RSLR than has been assumed for design.
3. Describe how and by whom the actual rate of RSLR will be monitored or tracked during the operational phase of the project, and how a higher RSLR would be used in adaptive management to consider future implementation of adaptation measures.

Literature Cited:

USACE (2011b). Sea-Level Change Considerations for Civil Works Programs. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Circular (EC) No. 1165-2-212. October.

APPENDIX B

Final Charge to the Independent External Peer Review Panel as Submitted to USACE on September 9, 2013

on the

WSLP-IEPR

This page is intentionally left blank.

Charge Questions and Guidance to the Panel Members for the Independent External Peer Review of the WSLP-IEPR

BACKGROUND

The purpose of the feasibility study is to determine the Federal interest in implementing a hurricane protection levee system to provide protection to St. Charles, St. John the Baptist, and St. James parishes against hurricane-induced tidal surges originating from Lake Pontchartrain and Lake Maurepas.

The specific plan formulation rationale for the feasibility study has evolved over the course of the many prior studies regarding hurricane and storm damage risk reduction in the study area. Due to the changing natural and social dynamics in the area, all prior formulations and rationales are being revisited during this feasibility study. These include the previously developed non-structural measures: evacuation, elevation of structures, and property acquisitions, and the structural measures: levees, floodwalls, flood gates, pump stations, tidal exchange structures and water storage areas. Since the authorization for this study provides for hurricane protection and flood control in St. Charles, St. John the Baptist, and St. James parishes, the alternatives to be evaluated are being limited to the needs in these three parishes. The rough order magnitude estimate of total project cost for the levees being investigated in the feasibility study range from $275 million to $450 million.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the West Shore-Lake Pontchartrain, Louisiana Hurricane Protection St. Charles, St. John the Baptist, and St. James Parishes, Louisiana Integrated Feasibility Report/Environmental Impact Statement (EIS) (hereinafter: WSLP - IEPR) in accordance with the Department of the Army, USACE, Water Resources Policies and Authorities' *Civil Works Review* (EC 1165-2-214, dated December 15, 2012), and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to assess the "adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (EC 1165-2-214; p. D-4) for the WSLP – IEPR documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in Civil Works planning, economics, biology/ecology, hydrologic and hydraulic engineering, civil/mechanical engineering, and geotechnical

engineering issues relevant to the project. They will also have experience applying their subject matter expertise to coastal storm damage reduction issues.

The Panel will be "charged" with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-214, Appendix D, review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

The following is a list of documents, supporting information, and reference materials that will be provided for the review.

Documents for Review
The following documents are to be reviewed by designated discipline:

Primary Documents Title	Approx. No. of Pages	Required Disciplines
WSLP Draft Integrated Feasibility Report/EIS	100	All Disciplines
Engineering Appendix	70	All Engineering Disciplines
Economics	40	Economics, Plan Formulation
Real Estate	100	Economics, Plan Formulation
Public Comments	50	All Disciplines
Primary Documents Page Count	**360**	

Documents for Review, continued

Hydrologic and Hydraulic Analysis	212	Hydrologic and Hydraulic Engineering
Civil Design	130	Civil/Mechanical; Geotechnical/Structural Engineering
Geotechnical and Structural Engineering	580	Geotechnical/Structural Engineering
Cost Engineering	15	Civil Work Planning ; Economics,; All Engineering Disciplines
Supporting Documents Page Count	940	

Documents for Reference

- USACE guidance Civil Works Review, (EC 1165-2-214) dated 15 December 2012
- Office of Management and Budget's Final Information Quality Bulletin for Peer Review released December 16, 2004.

SCHEDULE

This final schedule is based on the September 9, 2013 receipt of the final review documents. The schedule will be revised upon receipt of final review documents.

Conduct Peer Review		
	Battelle convenes kick-off meeting with panel members	9/12/2013
	Battelle convenes kick-off meeting with USACE and panel members	9/12/2013
	Panel members complete their individual reviews	9/26/2013
Prepare Final Panel Comments and Final IEPR Report	Battelle provides panel members with talking points for Panel Review Teleconference	
	Battelle convenes Panel Review Teleconference	10/1/2013
	Panel members provide draft Final Panel Comments to Battelle	10/9/2013
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	10/10-10/20/2013
	Battelle finalizes Final Panel Comments	10/21/2013
	Panel members provide comments on Final IEPR Report	
Comment/ Response Process	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	10/29/2013
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	10/29/2013
	USACE provides draft PDT Evaluator Responses to Battelle	11/4/2013
	Battelle provides the panel members the draft PDT Evaluator Responses	11/4/2013
	Panel members provide Battelle with draft BackCheck Responses	11/6/2013
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	11/7/2013
	Battelle convenes Comment-Response Teleconference with panel members and USACE	11/8/2013
	USACE inputs final PDT Evaluator Responses to DrChecks	11/18/2013
	Battelle provides final PDT Evaluator Responses to panel members	11/18/2013
	Panel members provide Battelle with final BackCheck Responses	11/20/2013

Task	Action	Due Date
Comment/ Response Process	Battelle inputs the panel members' final BackCheck Responses to DrChecks	11/22/2013
	*Battelle submits pdf printout of DrChecks project file	11/25/2013
ADMB	Agency Decision Milestone Briefing	11/21/2013
CWRB	Civil Works Review Board	4/17/2013

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the WSLP - IEPR documents are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, properly documented, satisfies established quality requirements, and yields scientifically credible conclusions. The Panel is being asked to provide feedback on the economic, engineering, environmental resources, and plan formulation. The panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel (by report section or Appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the WSLP - IEPR documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance. Note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-214; Appendix D).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.

4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable
7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also, please **do not** comment on or make recommendations on policy issues and decision making. Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review (ATR).
2. Please contact the Battelle Project Manager (Julian DiGialleonardo, digialleonardoj@battelle.org), Program Manager (Karen Johnson-Young (johnson-youngk@battelle.org) or Deputy Program Manager (Rachel Sell (sellr@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young (johnson-youngk@battelle.org) immediately.
4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Julian DiGialleonardo, digialleonardoj@battelle.org, no later than September 26, 2013, 10 pm ET.

Independent External Peer Review of the

West Shore-Lake Pontchartrain, Louisiana Hurricane Protection St. Charles, St. John the Baptist, and St. James Parishes, Louisiana Integrated Feasibility Report/Environmental Impact Statement

Charge Questions and Relevant Sections as Supplied by USACE

General Questions

1. Within the context of risk-informed decision-making, to what extent has it been shown that the project is technically sound?

2. Are the assumptions that underlie the engineering, and environmental analyses sound?

3. Within the context of risk-informed decision-making, are the engineering, and environmental methods, models and analyses used adequate and acceptable?

4. Were all models used in the analyses used in an appropriate manner with assumptions appropriately documented and explained?

5. Were risk and uncertainty sufficiently considered?

6. Was the process used to select the recommended alternative rational and was the process implemented in a reasonable manner given the project constraints?

7. Does the environmental impact statement satisfy the requirements of National Environmental Policy Act (NEPA)? Were adequate considerations given to significant resources by the project?

8. Assess the recommended alternatives from the perspective of systems. It should also include systemic aspects being considered from a temporal perspective, including the potential effects of climate change.

Safety Assurance Review Questions

9. Within the context of risk-informed decision-making, were the methods used to evaluate the condition of the structural features adequate and appropriate given the circumstances?

10. Have the appropriate alternatives been considered and adequately described for this project and do they appear reasonable?

11. Within the context of risk-informed decision-making, do the project features adequately address redundancy, resiliency, or robustness with an emphasis on interfaces between structures, materials, members, and project phases?

12. For the current design developed using limited detailed information, are the quality and quantity of the surveys, investigations, and engineering sufficient to assess expected risk reduction?

13. Have the hazards that affect the structures been adequately documented and described? If not, is the risk register documented accordingly?

14. Are the models used to assess hazards appropriate?

15. Are the assumptions made for the impacts appropriately documented and explained in the report documentation and/or risk register?

16. Is there sufficient information presented to identify, explain, and comment on the assumptions that underlie the engineering analyses? Has the risk register adequately documented assumptions and corresponding risks associated with limited detailed information associated with the various engineering analyses?

17. Are there any additional analyses or information available or readily obtainable that would affect decisions regarding the structures?

18. Does the physical data and observed data provide adequate information to characterize the structures and their performance?

19. Have all characteristics, conditions, and scenarios leading to potential failure, along with the potential impacts and consequences, been clearly identified and described? Have all pertinent factors, including but not necessarily limited to population-at-risk been considered?

20. Does the analysis adequately address the uncertainty given the consequences associated with the potential loss of life for this type of project?

21. From a public safety perspective, is the proposed alternative reasonably appropriate or are there other alternatives that should be considered?

22. Has anything significant been overlooked in the development of the assessment of the project or the alternatives?

23. Do the alternatives and their associated costs appear reasonable? Do the benefits and consequences appear reasonable?

Specific Charge Questions for the West Shore-Lake Pontchartrain, Louisiana Hurricane Protection St. Charles, St. John the Baptist, and St. James Parishes, Louisiana Integrated Feasibility Report/Environmental Impact Statement

Objectives

24. Is the purpose of the project adequately defined? If not, why?

25. Has the project need been clearly described?

26. Have the public concerns been identified and adequately described?

27. Are the specific objectives adequately described?

28. In your opinion, are there any other issues, resources, or concerns that have not been identified and/or addressed?

Alternatives

29. Has the criteria to eliminate plans from further study been clearly described?

30. Is each of the different alternative plans clearly described?

31. Within the context of risk-informed decision-making, were the assumptions made for use in developing the future with-project conditions for each alternative reasonable? Were adequate scenarios considered? Were the assumptions reasonably consistent across the range of alternatives and/or adequately justified where different?

32. Are the changes between the without- and with-project conditions adequately described for each alternative?

33. Have comparative impacts been clearly and adequately described?

34. Comment on the optimization and incremental analysis process for the final array of alternatives.

35. Are the criteria used to evaluate the multi-criteria decision analysis adequate and appropriate? If not, why?

36. Are there any unmitigated environmental impacts not identified and if so could they impact project designs?

37. Please comment on the likelihood of the recommended alternative will achieve the expected outputs.

38. Are residual risks adequately described and is there a sufficient plan for communicating the residual risk to affected populations?

39. Are future Operation, Maintenance, Repair, Replacement, and Rehabilitation efforts adequately described and are the estimated cost of those efforts reasonable for each alternative?

40. Within the context of risk-informed decision-making, have the impacts to the existing infrastructure, utilities, and transportation infrastructure been adequately addressed?

Affected Environment

41. Is the description of the climate in the study area sufficiently detailed and accurate?

42. Is the description of wetland resources in the project area complete and accurate?

43. Is the description of aquatic resources in the project area complete and accurate?

44. Is the description of threatened and endangered species resources in the study area complete and accurate?

45. Is the description of the historical and existing recreational resources in the study area complete and accurate?

46. Is the description of the cultural resources in the study area complete and accurate?

47. Is the description of the historical and existing socioeconomic resources in the study area complete and accurate? Were specific socioeconomic issues not addressed?

Environmental Consequences

48. Have impacts to significant resources been adequately and clearly described?

49. To what extent have the potential impacts of the alternatives on significant resources been addressed and supported?

50. Are the scope and detail of the potential adverse effects that may arise as a result of project implementation sufficiently described and supported?

51. Have impacts from borrow areas been adequately and clearly described?

Cumulative Impacts

52. Are cumulative impacts adequately described and discussed? If not, please explain.

Mitigation

53. Are mitigation measures adequately described and discussed? If not, please explain.

Economics Appendix

54. Were the benefit categories used in the economic analysis adequate to calculate a benefit-to-cost ratio for each of the project alternatives?

55. To what extent are the input parameters, methods, models and analyses used in the study methodology as documented in the Economics Appendix appropriate and consistent with current best management practices?

56. Were the methods to calculate structure and content values appropriate and adequately described?

57. Was the methodology to assess storm damages, and storm damage reduction appropriate and adequately described?

58. Were the methods used to develop the content-to-structure value ratios (CSVRs) appropriate and were the generated results applicable to the study area?

59. Has the report adequately addressed the issue of repetitive flood damages and the subsequent extent of rebuild/repair by property owners as relates to annual damage estimation and have scenarios identified in the report adequately addressed the range of impact to project justification?

60. Were risk and uncertainty sufficiently considered in relation to the future development process?

Hydrology and Hydraulics Appendix

61. Was the hydrology discussion sufficient to feasibility scope to characterize current baseline conditions and to allow for evaluation of how forecasted conditions (with- and without-proposed actions) are likely to affect hydrologic conditions?

Geotechnical Engineering

62. Is the description of the geomorphic and physiographic setting of the proposed project area accurate and comprehensive?

63. Were the geotechnical analyses adequate and appropriate for the current level of design as presented in the report documentation?

Civil Design

64. Have the design and engineering considerations presented been clearly outlined and will they achieve the project objectives?

65. Are any additional design assumptions necessary to validate the preliminary design of the primary project components?

66. Are the assumptions used to determine the cost of operations and maintenance for the proposed project adequately documented and explained?

Cost

67. To what extent have significant project construction costs been adequately identified and described?

68. Are the costs adequately justified?

Real Estate Plan

69. Comment on the extent to which assumptions and data sources used in the economics analyses are clearly identified and the assumptions are justified and reasonable.

70. Does the Real Estate Plan adequately address all real estate interests (public and private)?

71. Have potential relocations as a result of the project been adequately addressed?

72. Hazardous, Toxic, and Radioactive Waste

73. Within the context of risk-informed decision-making, comment on the extent to which impacts of the alternatives may have on hazardous, toxic, and radioactive waste issues?

Public Involvement and Correspondence

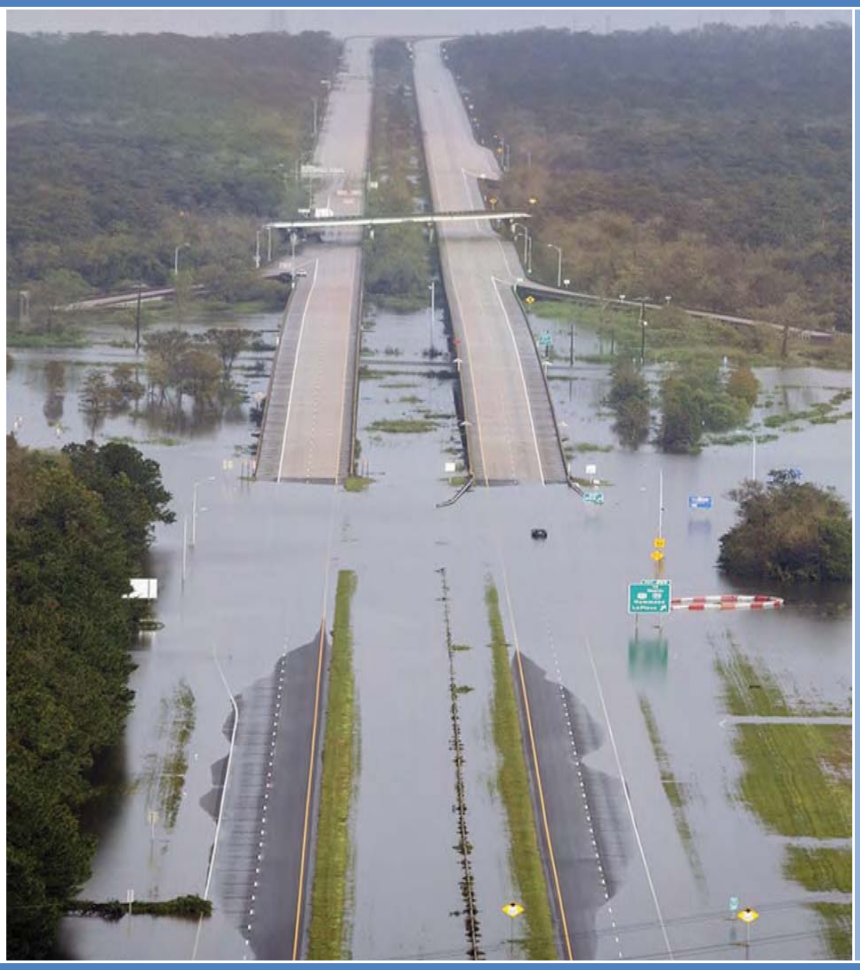
74. Based on your experience with similar projects, has adequate public, stakeholder, and agency involvement occurred to determine all issues of interest and to ensure that the issues have been adequately addressed to the satisfaction of those interested parties? Should additional public outreach and coordination activities be conducted?

Summary Questions

75. Please identify the most critical concerns (up to 5) you have with the project and/or review documents. These concerns can be (but do not need to be) new ideas or issues that have not been raised previously.

76. Please provide positive feedback on the project and/or review documents.

West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study



Integrated Draft Feasibility Report and Environmental Impact Statement

US Army Corps of Engineers®

U.S. Army Corps of Engineers
Mississippi Valley Division
New Orleans District

August 2013

Hurricane Isaac flooding in Laplace, Louisiana.

Comments: Please send comments or questions on this Draft Environmental Impact Statement (DEIS) to the U.S. Army Corps of Engineers, New Orleans District, Attention: Dr. William P. Klein, Jr., P.O. Box 60267, New Orleans, Louisiana 70160-0267. Telephone: (504) 862-2540; FAX: (504) 862-2088. **The official closing date for receipt of comments will be 45 days from the date on which the Notice of Availability of the Draft EIS appeared in the Federal Register.**

The U.S. Army Corps of Engineers prepared this feasibility report and Environmental Impact Statement for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction study. The Pontchartrain Levee District is the non-Federal Sponsor of the study. The report includes input from the study sponsors, natural resource agencies and the public. It presents potential solutions to reduce damages from hurricane and tropical storm surge for 62,900 residents in St. Charles, St. John the Baptist and St. James Parishes, Louisiana.

The study area offers a bounty of natural resources but it was historically subject to flooding from the Mississippi River and nearby lakes. Colonial settlers built levees along the river starting in the 1700s to combat annual floods. River levees allowed colonists to settle the area, grow crops and harvest natural resources.

The management of Mississippi River flood risks and the development of interior drainage systems in the 20th century, allowed urban and suburban expansion into the region beyond the high ground found adjacent to the river. The study area has no coastal storm levees and remains susceptible to damages from surges resulting from hurricanes and tropical storms. Some natural buffer protection is afforded by a large cypress swamp that separates developed areas from nearby tidal lakes. The swamp has degraded over time and the buffer it provides between the lakes and towns is decreasing.

Population is increasing with suburban and industrial development along the river corridor between Baton Rouge and New Orleans. Residents are attracted to the area's employment opportunities, quality of life and access to recreation. Increasing population and degrading natural buffers combine to create risks of damages from hurricane and tropical storm surge events. Future sea level rise exacerbates the risks of damage from storm hurricane and tropical storm surge events. As a result, hurricane and tropical storm surge damage is a substantial risk today that is expected to increase over time.

In August 2012 Hurricane Isaac struck the region causing extensive rainfall and storm surge flooding in the study area. After the storm President Obama toured the damaged area and met with residents and community leaders. The storm illustrates the risks faced in low-lying study area communities. Thousands of residents and businesses were flooded and continue to work towards community recovery today.

Key industries are located in the river corridor. The Port of South Louisiana is the largest volume port in the Western Hemisphere and the ninth largest in the world. It stretches along the Mississippi River between New Orleans and Baton Rouge and plays a critical role in the export of agricultural commodities from the Nation's heartland. Hurricane Isaac disrupted port logistics. Storm surge blocked facility access closing the port for days. Oil refineries, including the Nation's third largest, were shut down during and after the storm. Gasoline and chemical production stopped impacting an important industrial sector that supports National energy security. Regional and national fuel prices spiked. The storm caused agricultural losses due to an inability to drain flooded fields. Storm surge flooded ground-level parts of Interstate 10 and access to Interstate 55. These are critical transportation routes that support the regional and national economies and that play an important role in emergency evacuation, repopulation and post-storm recovery.

Eleven management measures were crafted to address storm surge. Structural and non-structural features included levees, elevating buildings and restoring cypress swamp. Measures were combined into a dozen alternative plans. A focused array of four alternative plans was evaluated under SMART Planning. Alternatives A and C are comprised of non-structural

measures and levee alignments. A third plan Alternative D) consists of a levee and flood wall alignment. A no-action plan is the basis to compare benefits and environmental impacts.

Alternative C is the Tentatively Selected Plan. It is an 18.27-mile levee around Montz, Laplace, Reserve and Garyville, reducing risk to over 7,000 structures. Additionally, four miles of I-10 flooded during Hurricane Isaac is within the proposed system. The plan includes non-structural measures for 1,571 structures in Gramercy, Lutcher and Grand Point. The estimated cost is $881,000,000 and annualized net benefits are $23,000,000 with a benefit to cost ratio of 1.63.

Over the next few months a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into a final report. The final report will be made available for state and agency and public review before the Chief of Engineers makes a final recommendation on the project.

Hurricane Isaac flooding at I-10 and US-51.

Table of Contents

Executive Summary (*NEPA Required) ..... **i**
1.0 Introduction **1-1**
1.1 Background 1-1
1.2 Purpose, Scope, and Need for the Study NEPA Required) 1-2
1.3 Problems, Needs and Opportunities 1-3
1.4 Need for Action 1-4
1.5 Objectives of Action 1-5
1.6 USACE Civil Works Guidance and Initiatives 1-6
1.7 Non-Federal Sponsor 1-7
2.0 Affected Environment (*NEPA Required) **2-1**
2.1 General Setting 2-1
2.2 Water Environment 2-1
2.3 Human Environment (Socioeconomics 2-7
2.4 Natural Environment 2-16
2.5 Cumulative Impacts for the Future Without Project Condition 2-28
3.0 Plan Formulation **3-1**
3.1 Prior Studies 3-1
3.2 Planning Constraints 3-2
3.3 Management Measures Considered and Screened NEPA required) 3-2
3.4 Initial Array of Alternatives (*NEPA required) 3-3
3.5 Final Array of Alternatives (*NEPA required) 3-6
3.6 Cost Estimates 3-10
3.7 Summary of Accounts and Comparison of Alternatives 3-11
3.8 Identifying the Tentatively Selected Plan 3-13
4.0 Environmental Consequences (*NEPA Required) **4-1**
4.1 Water Environment 4-1
4.2 Human Environment (Socioeconomics 4-5
4.3 Natural Environment 4-10
5.0 Tentatively Selected Plan (*NEPA Required) **5-1**
5.1 Description of the Tentatively Plan 5-1
5.2 Implementation Factors 5-5
5.3 Mitgation Plan 5-5
5.4 Adaptive Management & Monitoring 5-6
5.5 Views of the Non-Federal Sponsor 5-6
6.0 Environmental Laws & Compliance (*NEPA Required) **6-1**
7.0 Public Involvement **7-1**
7.1 Public Meetings and Other Coordination Efforts 7-1
7.2 Draft Report Recipients NEPA Required) 7-1
7.3 Views of the Public 7-2
8.0 Recommendations **8-1**
8.1 Recommended Plan 8-1
8.2 Plan Implementation 8-1
9.0 List of Preparers (*NEPA Required) **9-1**

Appendices

Appendix A: Environmental
Appendix B: Engineering
Appendix C: Real Estate
Appendix D: Economics
Appendix E: Plan Formulation
Appendix F: References

List of Tables

Table 1-1 NEPA-required information in this report 1-7
Table 2-1 Project area land use 2-2
Table 2-2 Relative sea level rise in the project area 2-3
Table 2-3 Parish-wide population (in 1000s) 2-7
Table 2-4 Number of households in study area (in 1000s) 2-7
Table 2-5 Summary of parish-wide storm damage insurance payments 1978 through 2012 2-9
Table 2-6 Historical parish-wide non-farm employment (in 1000s) 2-11
Table 2-7 Mean height (elevation) of major hurricane evacuation routes 2-12
Table 2-8 Potential transportation impacts 2-13
Table 2-9 Parish-wide per capita income 2-13
Table 2-10 St. James Parish communities percent minority and low income 2-15
Table 2-11 St. Charles Parish communities percent minority and low income 2-15
Table 2-12 St. John the Baptist Parish communities percent minority and low income 2-16
Table 2-13 Status, functions of interest, trends, and projections from 1985 through 2050 for avifauna, furbearers, game mammals, and reptiles with the study area 2-21
Table 2-14 Essential Fish Habitat for life stages of species in Lake Pontchartrain 2-24
Table 3-1 Relevant prior reports and studies 3-1
Table 3-2 Comparative details for final array of alternative plans 3-6
Table 3-3 Estimated first costs for final array of alternative plans 3-10
Table 3-4 Comparison of annual OMRR R cost for final array of alternative plans. 3-11
Table 3-5 Economic comparision of final array of alternative plans 3-12
Table 4-1 Soil associations directly impacted by alternative alignments 4-11
Table 4-2 Direct impacts resulting in loss of vegetation resources 4-12
Table 4-3 Average FQI, minimum and maximum FQI, and FQI converted to values between 0.1 – 1.0 for each alternative in the final alternative array 4-14
Table 4-4 HI, FQI, and average of the combination of HI and FQI for each alternative in the final alternative array 4-14
Table 5-1 Unit cost of pipeline relocations 5-2
Table 5-2 Cost apportionment of the TSP 5-5
Table 7-1 List of report recipients 7-1

List of Figures

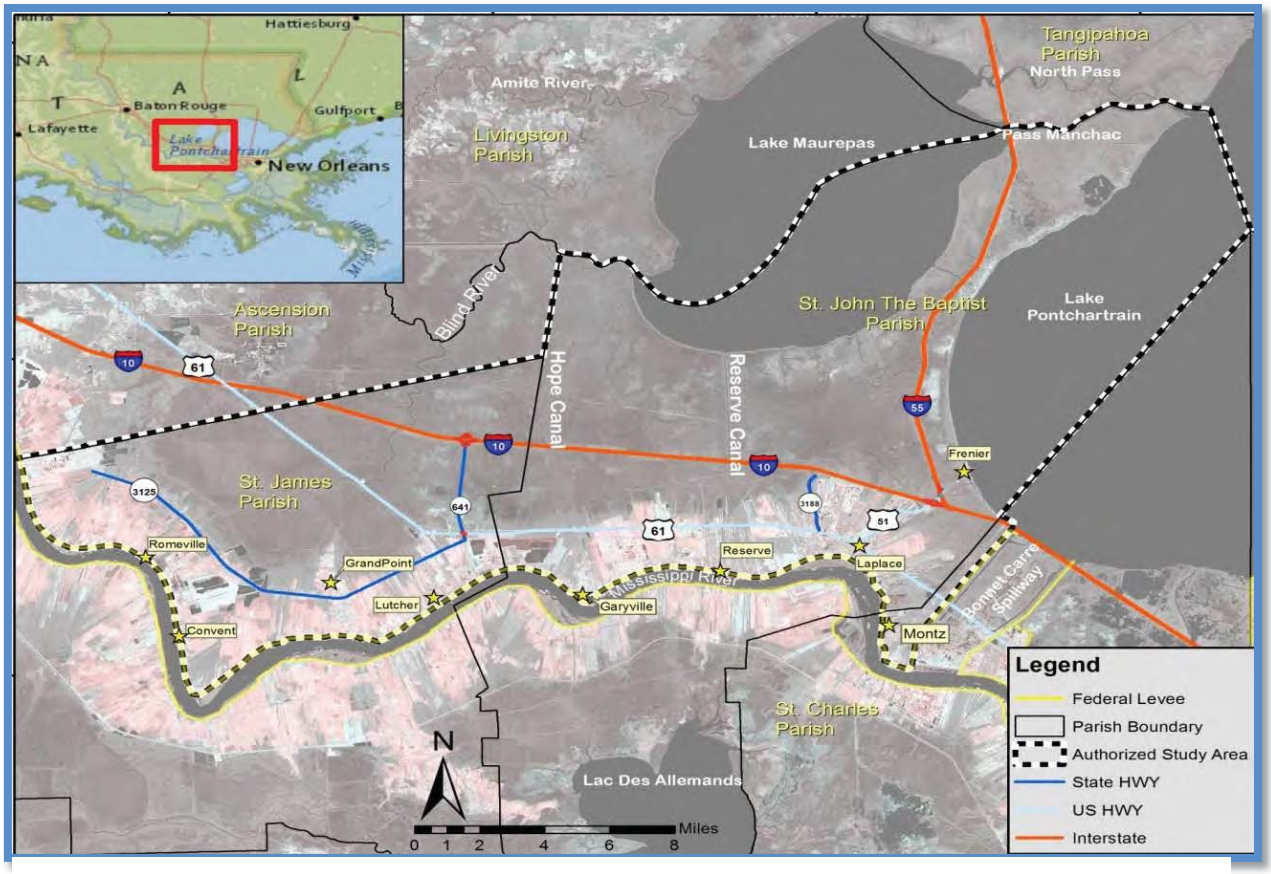
Figure 1-1 West Shore Lake Pontchartrain authorized study area 1-1
Figure 1-2 Old logging canals in Maurepas Swamp. 1-2
Figure 1-3 Area storm surge patterns 1-3
Figure 1-4 Hurricane tracks within 65 nautical miles of Laplace, Louisiana 1-3
Figure 1-5 Hurricane Isaac flooding in Laplace, Louisiana 1-4
Figure 1-6 President Obama in Laplace following Hurricane Isaac, September 3, 2012 1-5
Figure 1-7 Hurricane Isaac flooding at East St. John High School 1-7
Figure 2-1 Habitats and land loss within the project area 2-2
Figure 2-2 Relative sea level rise in the project area 2-3
Figure 2-3 Hurricane Isaac flooding in Laplace 2-8
Figure 2-4 Hurricane Isaac flooding of important transportation routes 2-8
Figure 2-5 First floor evaluations (existing conditions) 2-10
Figure 2-6 First floor evaluations (future without-project conditions) 2-10
Figure 2-7 EFH for white shrimp (green) and red drum (red) 2-25
Figure 2-8 Hurricane Isaac flooding in the River Forest subdivision in Laplace, Louisiana 2-29
Figure 3-1 Typical levee, floodwall (T-wall) and control structure 3-4
Figure 3-2 Supplemental non-structural plan area in St. James Parish 3-5
Figure 3-3 Economic reaches, FWOP condition 3-5
Figure 3-4 Final array of alternative plans. 3-6
Figure 3-5 Alignment and features of Alternative A 3-7
Figure 3-6 Alignment and features of Alternative C 3-8
Figure 3-7 Alignment and features of Alternative D 3-9
Figure 3-8 Study are drainage patterns 3-11
Figure 4-1 Model results of w/and w/o proposed levee alignment on tidal circulation 4-2
Figure 4-2 Modeling simulation flows during month of May for Area 5 4-2
Figure 4-3 Wetland areas within each alternative in the final alternative array 4-13
Figure 4-4 Laplace, Louisiana after Hurricane Isaac. 4-23
Figure 5-1 St. James Parish flooding after Hurricane Isaac 5-6

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE) Mississippi Valley Division MVD), New Orleans District CEMVN) prepared this feasibility report and Environmental Impact Statement EIS for the West Shore Lake Pontchartrain WSLP) Hurricane and Storm Damage Risk Reduction study. It includes input from the non-Federal study sponsor, natural resource agencies, and the public. This report presents potential solutions to reduce hurricane storm surge damages in St. Charles, St. John the Baptist and St. James Parishes, Louisiana. The study website is http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

1.1 Background

The study area Figure 1-1) is located in southeast Louisiana between the Mississippi River, and Lakes Maurepas and Pontchartrain. The towns of Montz, Laplace, Reserve, Lutcher, Gramercy, Grand Point, Convent, Garyville and Romeville are area communities. The 184,351 study acre area occupies a portion of one of the oldest delta complexes in the Mississippi River Deltaic Plain. It is located in the lower Mississippi River alluvial plain in the Pontchartrain Basin. The area includes residential and commercial developments south of Interstate 10 (I-10 . West of Laplace, a majority of the developed areas are found between U.S. Highway 61 US-61) and the Mississippi River levee. The area north of I-10 comprises the State of Louisiana's Maurepas Swamp Wildlife Management Area WMA). The project area includes lands potentially impacted by the proposed action.



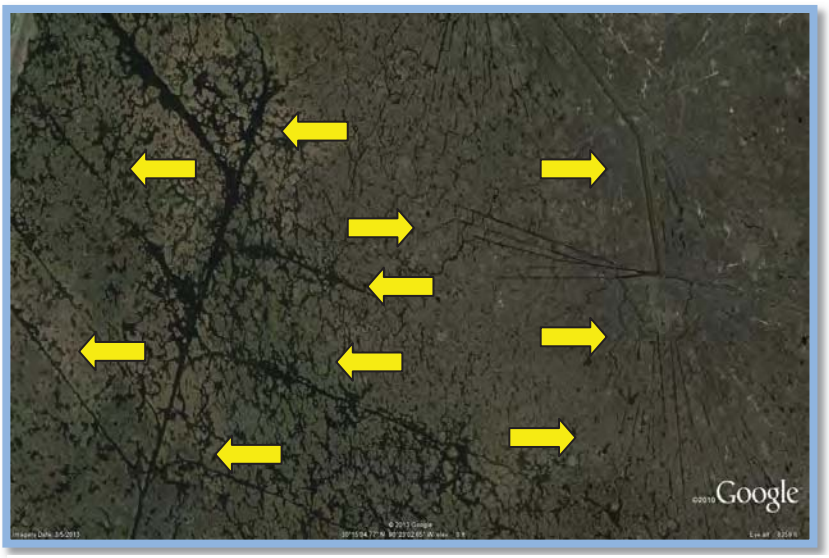
Hurricane or tropical storm winds push on the ocean's surface, causing a rise of water over and above the predicted tide. This is called storm surge. Hurricanes and tropical storms are an important part of Louisiana's history and culture. The region experiences tropical waves,

depressions, storms and hurricanes. The study area is highly susceptible to storm surge. The destruction caused by a 1915 hurricane was recounted years later:

> *"… an enormous storm surge advanced with great rapidity upon the western shore of Lake Pontchartrain well ahead of the eye of the hurricane which very nearly struck Frenier head on. As the storm came ashore in the New Orleans area, fifty people drowned as a thirteen foot storm surge swept the Rigolets railroad bridge away. It should also be emphasized that damage and destruction to homes and property were occurring even as the eye of the hurricane was 165 miles from Frenier. Two-hundred seventy-five Louisianians lost their lives as a result of the "Great West Indian Hurricane of 1915."* Landry 1996)

Recent hurricanes impacting the area include Katrina and Rita in 2005, Gustav and Ike in 2008, and Isaac in 2012. These storms threatened a region that plays a vital national economic role and that serves as a key transportation corridor.

An important swamp buffer separating development from nearby lakes has been impacted over time. The closure of bayous and the construction of levees cut off the annual flooding that historically nourished and maintained the cypress/tupelo habitat in the Maurepas Swamp. The cypress forests of the swamp were logged in the 1890s – 1930s. Canals and railroads were built through the swamp to remove cut timber Figure 1-2). The swamp is converting to fragmented marsh and open water USACE 2010a, USACE 2010b). The area may experience up to 2.32-feet of relative sea level rise (RSLR over the next 50-years under an "intermediate" scenario. The surge buffer benefits of the swamp will continue to diminish as it degrades and disappears and as sea level rises.



1.2 Purpose, Scope, and Need for the Study (*National Environmental Policy Act Required)

The study purpose is to provide a recommendation for Federal participation in hurricane storm damage risk reduction for St. Charles, St. John the Baptist and St. James Parishes that would be economically and environmentally justified. The study addresses flooding caused by storm surge but does not address rainfall flooding. There have been significant changes over the last 40 years, especially since Hurricane Katrina. Population has grown over the past few decades. This report presents a collaboratively-developed plan prepared in accordance with the National Environmental Policy Act NEPA) and Engineering Regulation 1105-2-100, the USACE Planning Guidance Notebook. It consists of a main report and appendices, and identifies the expected benefits, estimated cost and implementation responsibilities for a tentatively selected plan (TSP). The report provides an overview of the study and summarizes detailed information found in technical appendices. The report is an interim response to the study authority.

1.3 Problems, Needs and Opportunities

Problems in the Study Area

1. Storm surge flooding of approximately 7,698 structures (6-8 feet in areas).
2. Hurricane evacuation routes become impassable and receive damages during storm surges.
3. Agricultural losses resulting from prolonged periods of standing water (e.g., inability to drain saltwater).

Storm surge flooding damages homes, businesses and infrastructure. Surge travels from the Gulf of Mexico into the basin and floods the three study area parishes and beyond Figure 1-3 . Since 1855, 70 hurricanes have made landfall within 65 nautical miles of Laplace Figure 1-4). Hurricanes Betsy 1965 , Camille 1969), Juan 1985), Andrew 1992), Katrina and Rita 2005), Gustav and Ike 2008), and Isaac 2012) caused storm surge flooding. Hurricane Isaac's surge, measured from 6 to 8 feet in the area, threatened lives and damaged more than 7,000 homes, closed roads and disrupted the Nationally-significant energy industry Figure 1-5).

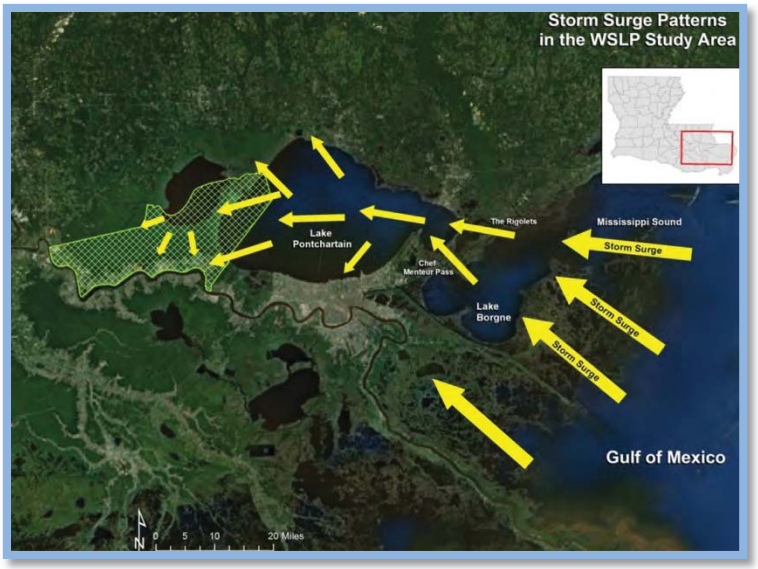


Figure 1-3: Area storm surge patterns.

Businesses and workers serving the Port of South Louisiana are located in the area. The port is the largest volume port in the Western Hemisphere and the ninth largest in the world. It stretches 54 miles on the Mississippi River between New Orleans and Baton Rouge. Hurricane Isaac disrupted port logistics. Its storm surge blocked facility access closing the port. Oil refineries, including the Nation's third largest, were shut down. Gasoline production stopped. Regional and National fuel prices spiked. The storm caused extensive agricultural losses due to an inability to drain storm surge water from fields.

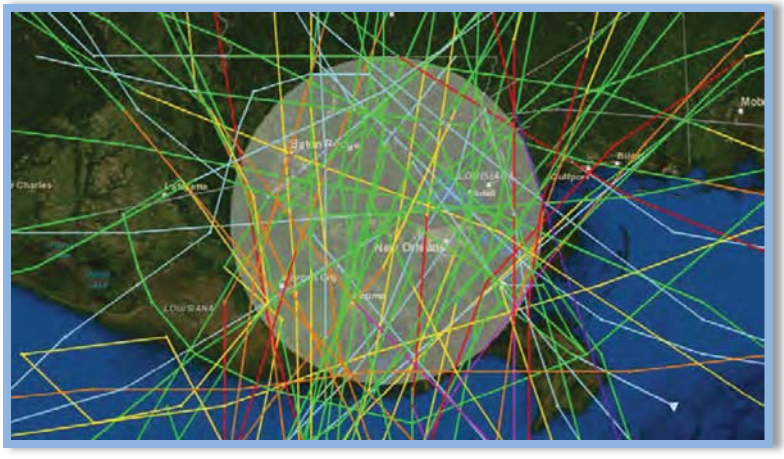


Figure 1-4: Hurricane tracks within 65 nautical miles of Laplace, Louisiana (NOAA 2013).

The study area setting offers a bounty of natural resources but it was historically subject to flooding from the river and nearby lakes. Levees were constructed along the Mississippi River starting in the 1700s to combat annual floods. These levees allowed settlement of the area and agricultural production and the harvesting of natural resources. The area remains susceptible to floods from tropical storms and hurricanes. Some natural protection is afforded by a large cypress swamp that

Figure 1-5: Hurricane Isaac flooding in Laplace, Louisiana.

separates developed areas from nearby tidal lakes. The swamp has degraded over time and the buffer it provides between the lakes and towns is decreasing. As a result, flooding from storm surge Figure 1-3 remains a risk that is expected to increase over time. The management of Mississippi River flood risk, and the accompanying development of interior drainage systems, allowed urban and suburban expansion in much of the region beyond the natural high-ground near the Mississippi River. Population has increased with suburban development between Baton Rouge and New Orleans. Residents are attracted to the area because of employment opportunities, quality of life, and access to recreation. These factors, increasing population and degrading natural buffers, combine to increase storm surge flooding risks.

1.4 Need for Action

The U.S. Congress recognized the need for a hurricane and storm damage risk reduction project in the area. Two Congressional resolutions authorize this study. The first was adopted on July 29, 1971 by the U.S. House of Representatives Committee on Public Works.

> *"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Lake Pontchartrain and Vicinity, Louisiana, published as House Document No. 231, 89th Congress, First Session, and other pertinent reports, with a view to determining whether modifications to the recommendations contained therein are advisable at this time, with particular reference to providing additional levees for hurricane protection and flood control in St. John the Baptist Parish and that part of St. Charles Parish west of the Bonnet Carré Spillway."*

The U.S. Senate Committee on Public Works adopted a resolution on September 20, 1974.

> *"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, that the Board for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Lake Pontchartrain and Vicinity, Louisiana, published as House Document No. 231, 89th Congress, First Session, and other pertinent reports, with a view to determining whether modifications to the recommendations contained therein are advisable at this time, for hurricane protection and flood control in St. James Parish."*

The study was first funded in the 1980s. A 1985 Reconnaissance Report found that there was no justified structural plan suitable for Federal participation. A 1987 reconnaissance report indicated that under Federal criteria a solution could not be found that would be economically justified or environmentally acceptable. Because of increasing population and economic activity,

a 1997 reconnaissance report indicated that the study should proceed into feasibility phase. A Feasibility Cost Share Agreement was executed with the Pontchartrain Levee District PLD) in 1998. The study stopped in 2002. Following Hurricane Katrina, renewed interest by the levee district led to an amended agreement in 2008. Planning for the project was underway when Hurricane Isaac hit in August 2012. President Obama traveled to Laplace, Louisiana after the storm to view the damage and visit with residents and local leaders Figure 1-6). The President said, **"*We're getting on the case to figure out what happened here and what we can do to make sure it won't happen again.*"** The USACE's post-Isaac damage assessment met the first part of the President's commitment. This study will help deliver the second part.

Figure 1-6: President Obama in Laplace following Hurricane Isaac, September 3, 2012. (Getty Images)

1.5 Objectives of Action

Identifying problems, needs, opportunities, and objectives ensures unity of purpose throughout the planning process. Solving problems and taking advantage of these opportunities provides a basis for effective solutions. **Critical needs** were identified based on the problems.

Critical Needs in the Study Area

1. Keep hurricane evacuation routes open before and after storms.
2. Reduce property damage.
3. Inform public of increased risk of living in flood prone areas.

Opportunities to solve problems were identified based on these needs.

Study Opportunities

1. Reduce hurricane flood risks and damages.
2. Provide smart growth education.
3. Educate local planners and public officials on potential future stages (e.g. 2070).
4. Improve flood warnings for preparation and/or evacuation.
5. Develop measures to reduce damages to evacuation routes due to storm surge.
6. Recommend future modifications to the roadway systems.
7. Develop measures to reduce the flood risk to agricultural areas.
8. Modify connection between lakes and developed areas.

A **study goal** based on the problems, needs and opportunities was developed to help create and evaluate alternative plans. It is the overarching intent of the project.

Study Goal

Reduce the risk of storm surge damages.

A **planning objective** states the intended purposes of the planning process. It is a statement of what solutions should try to achieve. Objectives provide a clear statement of the study purpose.

Planning Objectives

1. Reduce hurricane storm surge related damages through 2070.
2. Reduce risk to residents' life and health by decreasing flooding to the maximum extent practical.
3. Increase public awareness of hurricane risks in developed flood prone areas.
4. Enhance public awareness of the risk to life and property of development in flood prone areas.
5. Reduce the risk of damage and loss of critical infrastructure, specifically the I-10/I-55 hurricane evacuation routes.

1.6 USACE Civil Works Guidance and Initiatives

USACE planning is grounded in the 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Implementation Studies Principles and Guidelines). The Principles and Guidelines provide for the formulation of reasonable plans responsive to National, state and local concerns. Within the framework of the Principles and Guidelines, the USACE seeks to balance economic development and environmental needs as it addresses water resources problems. The Federal objective of water and related land resources planning is to contribute to National Economic Development NED) consistent with protecting the Nation's environment, in accordance with National environmental laws, Executive Orders and other Federal planning requirements. The Planning Guidance Notebook provides the overall direction to formulate, evaluate and select projects for implementation. The study conforms to the USACE Campaign Plan goals and the USACE Environmental Operating Principles.

NEPA is the Nation's charter legislation for protecting of the environment. The Federal regulations for implementing NEPA are found in Title 40 Code of Federal Regulations CFR Parts 1500-1508. The intent of NEPA is to ensure that information is made available to public officials and citizens regarding major actions taken by Federal agencies, and to identify and consider concerns and issues from the public. "*Any environmental document in compliance with NEPA may be combined with any other agency document to reduce duplication and paperwork*" 40 CFR §1506.4 . This document integrates discussions that normally would appear in an EIS into the feasibility report. Sections in this report include NEPA-required discussions marked "*(*NEPA Required)*" in both the Table of Contents and within the body of the document to assist readers. Table 1-1 lists the required EIS information and its location in this document.

1.6.1 NEPA Scoping Process

NEPA provides for an early and open process to determine the scope of issues to be addressed and identify the significant issues related to a proposed action. A Notice of Intent to prepare an EIS was published in the Federal Register Volume 73, No. 235 on December 5, 2008. The scoping period ended on February 16, 2009. Scoping identified concerns and preferences for levees. People are concerned about construction times, wetlands, hurricane evacuation routes and funding. The scoping report is available upon request.

Table 1-1: NEPA-required information in this report.

EIS Requirement	Location in this Document
Cover sheet	Cover page
Summary	Executive Summary
Table of Contents	Table of Contents
Purpose of and Need for Action	Chapter 1
Alternatives Including Proposed Action	Chapter 3
Affected Environment	Chapter 2
Environmental Consequences	Chapter 4
List of Preparers	Chapter 9
List of Report Recipients	Chapter 7
Index	Appendix F
Appendices	Listed in the Table of Contents

1.7 Non-Federal Sponsors

The Pontchartrain Levee District is the study non-Federal sponsor NFS). The Louisiana Coastal Protection and Restoration Authority Board CPRAB) is the NFS for construction, and for operations, maintenance, repair, rehabilitation, and replacement (OMRR&R).

Figure 1-7: Hurricane Isaac flooding at East St. John High School. (Times-Picayune)

2.0 AFFECTED ENVIRONMENT (*NEPA Required)

This chapter describes the affected environment. The historic and existing conditions and a forecast of the "future without-project" conditions provide the basis for plan formulation. The future without-project condition is the No Action Alternative. Important resources, potentially impacted by the proposed action, and their significance are explained in Appendix A. Topics in this chapter mirror Chapter 4, where the "future with-project" conditions are considered.

Water use, water supply and ground drinking water were assessed and determined to not be significantly affected by the proposed action. These resources will not be further discussed in this report. Air quality for the three parish area is in attainment of all National Ambient Air Quality Standards. Consistent with the Louisiana Administrative Code, a general conformity determination is not required and therefore air quality will not be discussed further. The cumulative impact analysis follows the 11-step process described in "Considering Cumulative Effects Under the National Environmental Policy Act" CEQ 1997).

2.1 General Setting

Climate: The climate is subtropical marine with long humid summers and short moderate winters. The seasonal rainy period occurs from mid-December to mid-March with dry periods in May, October and November. Average annual rainfall is 60 inches with a monthly maximum of 20 inches. The heaviest rainfalls usually occur during the summer, with July being the wettest month averaging 6.42 inches. October is usually the driest month, averaging 3.01 inches of rain.

Physical Features: The geology of the lower Mississippi River alluvial valley and the Louisiana coast is summarized in the LCA Ecosystem Restoration Study USACE 2004). Lakes Maurepas and Pontchartrain occupy a portion of the old Mississippi River pathway known as the St. Bernard Delta. The complex formed in what was then Pontchartrain Bay, enclosing a portion of it to form Lake Pontchartrain. The St. Bernard delta complex was formed by Mississippi River deposits between 3,000 and 4,000 years ago (Frazier 1967). The majority of other landform features include inland swamp, tidal channels, shallow lakes and bays, natural levee ridges along active and abandoned channels, barrier islands and beaches.

Land Use and Land Loss: The 184,351-acre area contains residential and commercial developments south of I-10. West of Laplace the majority of development is between US-61 and the Mississippi River levee. The area north of I-10 is comprised of undeveloped wetlands in the Maurepas Swamp Wildlife Management Area (WMA). Various land cover classifications from the LCA habitat dataset for calendar year 2000 are presented in Figure 2-1 and Table 2-1.

2.2 Water Environment

Water Stage Duration and Frequency: Normal astronomical tides in Louisiana are diurnal one high tide and one low tide per day and can have a spring range of as much as 2 feet. The mean tidal range is approximately 0.51 feet NOAA 2013a). Amplitudes are influenced by tides, but are generally controlled by meteorological events. East winds drive water into the lake.

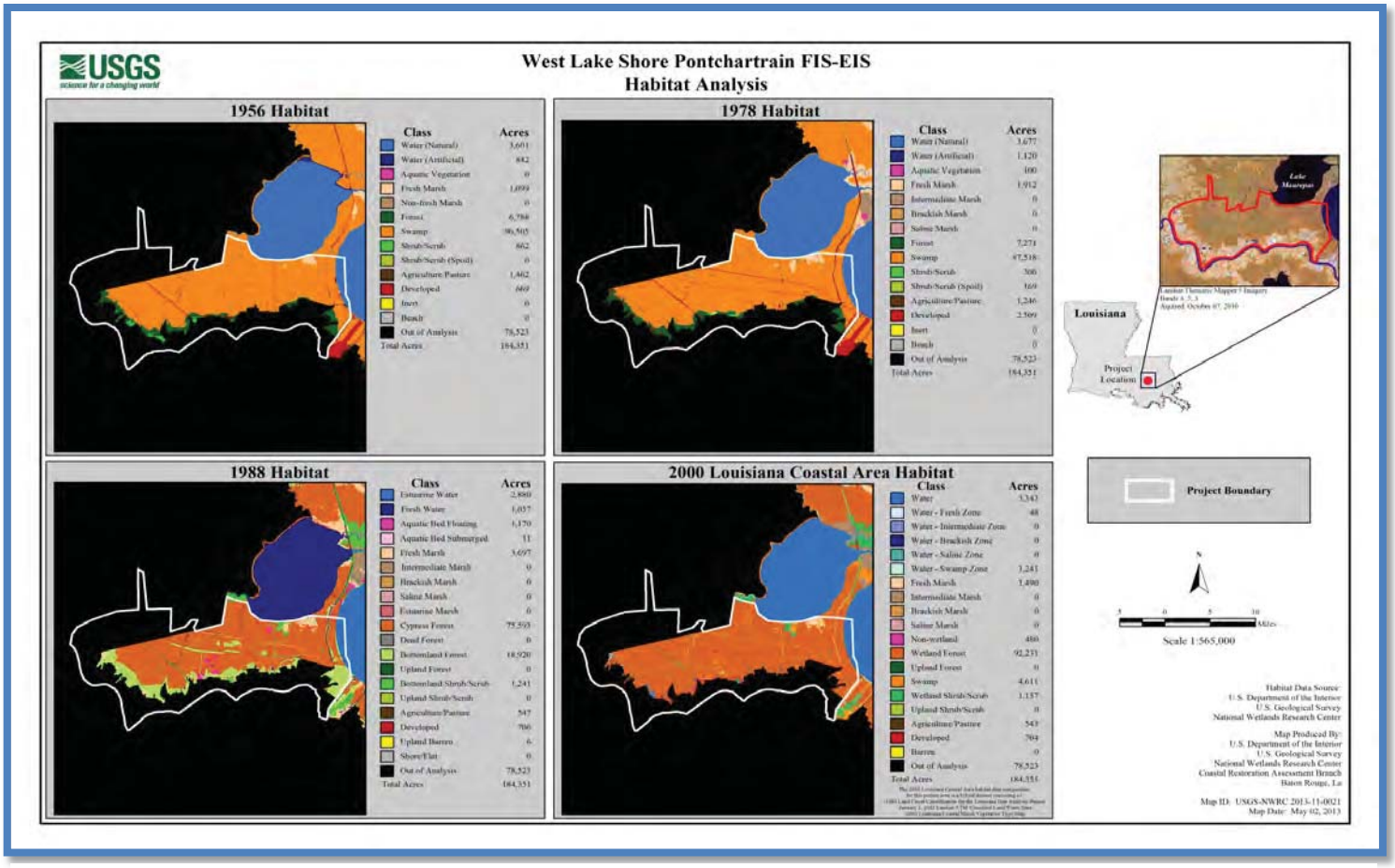


Table 2-1: Project area land use.

Land Cover Classification	Acres	Percent of Project area
Water	3,343	1.8
Water – Fresh Zone	48	0.02
Water – Swamp Zone	1,241	0.67
Water – Fresh Marsh	1,490	0.80
Non-Wetlands	480	0.26
Wetland Forest	92,231	50.03
Swamp	4,611	2.50
Wetland Shrub/Scrub	1,137	0.62
Agriculture/Pasture	543	0.29
Developed	704	0.38
*Out of Analysis	78,523	42.59
TOTAL	**184,351**	

***Out of analysis: areas not classified in original habitat analysis may contain other land cover classification elements. (NWRC 2013)**

Relative Sea Level Rise: Sea level rise SLR) conditions were modeled. Mesh and grid elevations were not adjusted for subsidence in this analysis. Rather, the predicted subsidence levels were incorporated in the initial water level parameter to capture the combined effects of subsidence and local SLR into a single relative sea level rise RSLR) value. For the 2020 and

2070 hydrology simulations, unique RSLR values were added to the 2011 initial water surface elevations WSE to calculate the initial WSE appropriate for each year and SLR rate. RSLR values were developed. SLR and RSLR data is listed in Table 2-2 and shown in Figure 2-2.

Table 2-2: Relative sea level rise in the project area.

Year and SLR Scenario	SLR (NAVD88 feet)	RSLR (NAVD88 feet)
2020 Low SLR	0.06	0.30
2020 Intermediate SLR	0.10	0.34
2020 High SLR	0.23	0.47
2070 Low SLR	0.33	1.81
2070 Intermediate SLR	0.85	2.32
2070 High SLR	2.47	3.95

2.2.1 Flow and Water Levels

Historic and Existing Conditions

Changes in the Mississippi River have been responsible for changes in the flow and water levels in the area over several geological periods. Processes involved in the formation of the various deltaic lobes controlled both water levels and flow directions. Seasonal flooding of the Mississippi River has contributed to the historic flow and water level characteristics of the area. Large flood events would bring freshwater, sediment and nutrients to the back swamp areas.

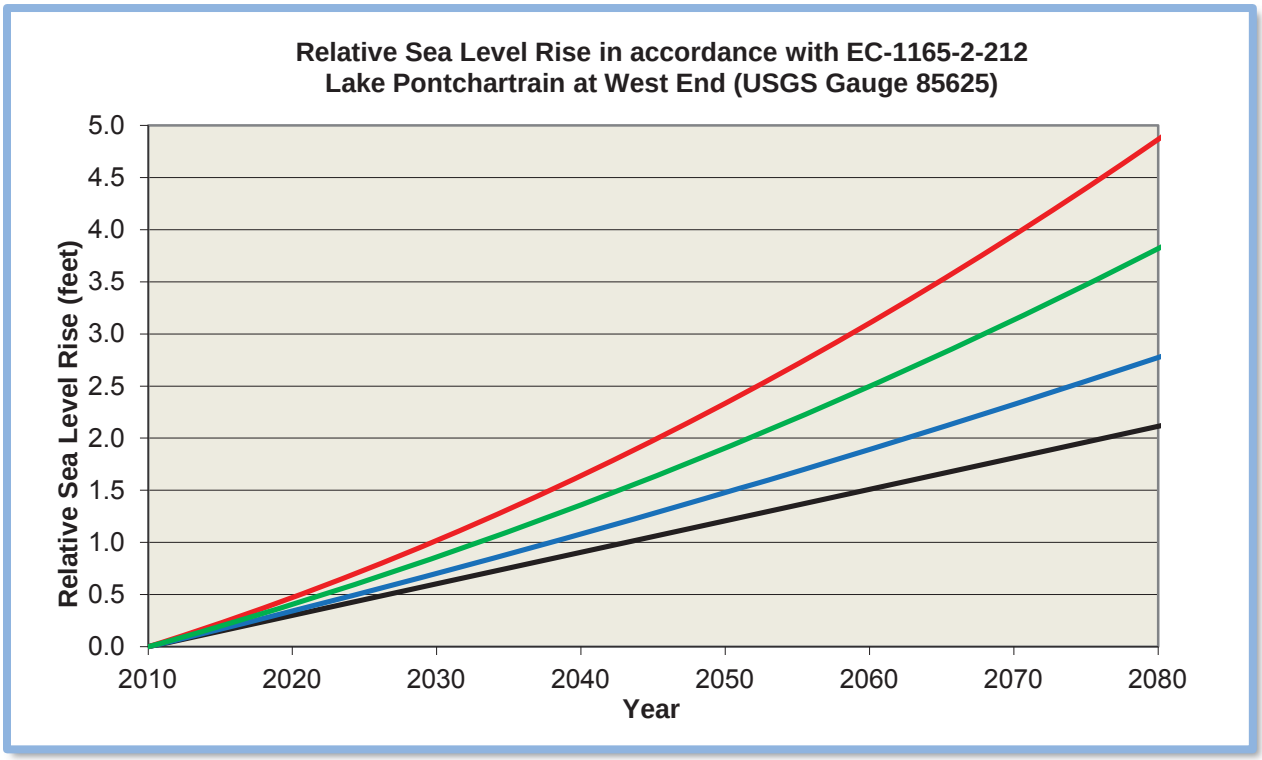


Figure 2-2: Relative sea level rise in the project area. Black = extrapolation of historic rate of RSLR. Blue = low RSLR scenario. Green = intermediate RSLR scenario. Red = high RSLR scenario.

River levees were built in the area beginning in the 1700s by local landowners and governments. Levee building continued through the settlement period and by 1812, the year Louisiana became a state, levees stretched 130 miles upstream from New Orleans to Baton Rouge. The Mississippi River and Tributaries project MR&T was authorized by Congress after the Great Mississippi River Flood of 1927. The project provides flood risk reduction for the

Mississippi River and tributaries system from Cape Girardeau, Missouri to the Head of Passes, Louisiana. Levees permanently altered the hydrology of the area by preventing riverine flooding and reducing freshwater inputs to the backwater swamps, Lakes Maurepas and Pontchartrain USACE 2010). Although the river is no longer directly connected to Lake Maurepas, it is connected to Lake Pontchartrain through the Inner Harbor Navigational Canal and periodic openings of the Bonnet Carré Spillway.

The area's water budget is composed of inflows and outflows through precipitation, evaporation, stream flow, base flow; direct groundwater flow, as well as flows in and out of the estuary. Lake Maurepas is a shallow, fresh to intermediate basin, receiving daily mean freshwater discharge dmd primarily from the Amite and Tickfaw Rivers; and to a lesser extent, the Blind River American Institute of Hydrology, 2006). Lake Pontchartrain is a shallow, brackish basin that receives freshwater discharge from the Tangipahoa, Pearl, and Tchefuncte Rivers, as well as Bayous Lacombe and Liberty, and many smaller creeks.

LCA restoration projects in the study area are closely related and intended to function together to increase freshwater and nutrient inputs to the Maurepas Swamp USACE 2004). The LCA Convent Blind River Diversion CBRD) will introduce Mississippi River water to the Maurepas Swamp near Convent, Louisiana USACE 2010a). The LCA Amite River Diversion Canal ARDC) would have modified the canal to spread freshwater into the swamp between the Amite River and the Blind River USACE 2010b). The USACE and State of Louisiana entered into a Design Agreement for Federal implementation of the project. However, in a letter dated August 20, 2012 the State of Louisiana suspended further state participation in Federal design efforts. It is possible that this project would be implemented independently by the State of Louisiana.

The Coastal Wetlands Planning, Protection and Restoration Act CWPPRA) project PO-29 "River Reintroduction into Maurepas Swamp" project would divert Mississippi River water to the Maurepas Swamp through Hope Canal. Construction of this project was planned to transition under the LCA program as the "Hope Canal Diversion" project. The project is currently not authorized for construction under either the CWPPRA or LCA programs. It could potentially significantly change area hydrology. As part of the WSLP scoping effort, correspondence from CPRA formerly the OCPR) requested that the features of the CWPPRA project be incorporated into the WSLP study. CPRA's letter emphasized that any storm damage control structure constructed in the area should allow for the exchange of water in the swamp north and south of I-10. Although the CWPPRA project has been in the engineering and design phase the Environmental Protection Agency, as the lead Federal sponsor for the CWPPRA project, has suspended Federal expenditure on this project as a result of plans by the State of Louisiana to independently implement this project. Recently, the State of Louisiana submitted a permit application to construct the project as an independent effort. If this permit is obtained by the State, the project will not be implemented by the programs.

Because of the uncertainty as to the entity that would implement the ARDC and PO-29 diversion projects in the Maurepas Swamp, further references in this report to the ARDC and PO-29 diversions will be collectively to the "Maurepas Swamp Diversions," and will not reference Federal or State responsibility for implementation.

Future Without-Project Conditions No Action Alternative)

There would be no direct, indirect or cumulative impacts with the No Action Alternative. Existing conditions and future changes to flow and water levels would not change.

2.2.2 Sedimentation and Erosion

Historic and Existing Conditions

The area has one of the highest land subsidence rates in the country, estimated at 0.4 inch annually. The rate is variable along the coast Battelle 2005 . Coastal Louisiana is more prone than other areas to subsidence and land loss. Human actions have exacerbated the problem.

Shoreline erosion along Lake Maurepas, measured by the USGS Coastal and Marine Geology Program since 1899, shows an average shoreline loss between 1899 and 1995 of approximately 39 inches per year Zganjar et al. 2002). Shoreline erosion may be attributed to storm surges, lack of sediment entering the area, canal construction, logging operations, and wind and waves. In addition, RSLR and associated saltwater influx has caused increased erosion in coastal wetland areas.

Saucier 1963) calculated Lake Pontchartrain shoreline retreat by comparing aerial photographs from 1931 through 1937, with photographs from the 1950 through 1954. The data shows average annual erosion for one-mile stretches of shoreline. The southwestern shoreline retreats at a mean rate of 8.9 feet per year compared to 3.6 feet per year for the north shore and about 5.6 feet per year for the south shore. Saucier attributed shoreline erosion to subsidence, lack of sediment input, increasing fetch and SLR.

The Maurepas swamp, which includes the 103,263-acre Maurepas Swamp WMA, is isolated from Mississippi River fresh water, sediment, and nutrient inputs by levees LDWF 2005). The only soil building in the swamp is from organic wetland production Shaffer et al. 2003). Area subsidence is classified as intermediate. When coupled with minimal soil building, net lowering of ground surface elevation results (Shaffer et al. 2003).

The CBRD and the Maurepas Swamp Diversions are intended to sustain this unique swamp system USACE 2004, 2010a and 2010b . The diversion(s) would increase flow through the southwestern portions of the area, which is intended to provide a constant source of oxygen- and nutrient-rich waters to the swamp. Benefits would include measurable increases in productivity, which could help build swamp substrate and balance subsidence, reduce mortality, and increase soil bulk density. As accretion improves, there could be an increase in recruitment of new cypress and tupelo. Anticipated sediment benefits could include direct contribution to accretion, as well as contribution to biological productivity through the introduction of sediment-associated nutrients, which also could contribute to production of substrate.

Future Without-Project Conditions No Action Alternative

There would be no direct, indirect or cumulative impacts. Existing conditions and future changes to sedimentation and erosion in the area would persist as would potential offsets to those losses by restoration impacts from the CBRD and the Maurepas Swamp Diversions. Soil erosion and land loss would continue at the same or increased rates. Natural and man-made levees would continue to subside and organic soils would not be able to maintain their elevations due to subsidence, decreased plant productivity, and wave erosion USACE 2004). Sediments would continue to be transported from terrestrial areas into Lakes Maurepas and Pontchartrain.

2.2.3 Water Quality and Salinity

Historic and Existing Conditions

Water Quality Influences: Area water quality is influenced by basin elevations, surface water budget, land cover and use, coastal deltaic processes, and regional weather. The study area is in the western portion of the Pontchartrain Basin. The basin is influenced by several rivers which provide freshwater to estuarine lakes connected to each other and, ultimately, to the Gulf of

Mexico via several major passes. The estuary has experienced hydro-modification via the construction of canals and embankments such as road and railroad beds and hurricane storm damage risk reduction features Keddy et al. 2007, Sikora and Kjerive 1985, Tate et al. 2002 . The basin includes upland forest and agricultural land north of the estuary, wetlands and open water in the estuary, development and agriculture along the Mississippi River corridor and in nearby urban areas Demcheck et al. 2004, Brown et al. 2010, Wu and Xu 2007, Turner et al. 2002, Patil and Deng 2008). Chemical transformations occurring in the estuary can be biologically mediated by wetlands Mitsch and Gosselink 2000 . A diversity of wetland types exist in the estuary which are affected by coastal deltaic processes and anthropogenic factors Gosselink 1984, Keddy et al. 2007). Weather patterns can affect estuary marine influence, flow direction, water level, and wetlands biogeochemistry Gosselink 1984). Timing and amount of precipitation can also affect water quality Demcheck et al. 2004, Keddy et al. 2007 .

Literature Review: Development in the basin in the 20th century led to degradation of estuary waters Hastings 2009 . Historical pollution sources include sewage discharges, increased urbanization and farming, mining of water bottoms, and oil and gas activities. While recently many of these sources are curtailed or eliminated, urbanization and farming are increasing Patil and Deng 2008, Brown et al. 2010, Turner et al. 2002, Wu and Xu 2007). Garrison 1999 provides a water quality summary for data collected in Lake Maurepas from 1943-1995. Sikora and Kjerve 1985) and Tate et al 2002) both compared pre-/post-MRGO salinity trends, finding a 0.2-0.4 PPT increase at Pass Manchac. Patil and Deng 2008) investigated water quality of the Amite River; dissolved oxygen DO) levels in the river decreased by 1 mg/L between 1975-1990 and 1991-2005. Findings of the study implicate continued mining in the river and increased urbanization of the watershed. Recently, a total maximum daily load TMDL) for the river for DO was developed LDEQ 2011). Studies were conducted in support of the diversion of Mississippi River water into the Maurepas Swamps e.g., Lee Wilson and Associates 2001, Shaffer et al. 2003, Hoeppner et al. 2008, Lane et al. 2003, Shaffer et al. 2009 , and discuss water quality, and suggest that diversions may be beneficial during droughts.

Louisiana Water Quality Inventory: Historical (1998-2012) Clean Water Act Section 305(b assessments of study area sub-segments were evaluated. For each sub-segment, an average designated use support value was calculated 0 always impaired, 1 unimpaired; see Appendix A for methodology and details). Long-term average support values reveal that impairments are commonplace in sub-segments west of the Maurepas land bridge. The most commonly suspected causes included in the 305(b assessments were non-native aquatic plants; low DO, mercury, fecal coliform, total phosphorus, sedimentation/siltation, and elevated turbidity, while the most commonly suspected sources were unknown sources such as, atmospheric deposition, introduction of non-native organisms, on-site treatment systems, wetland habitat modification, and site clearance for land development/redevelopment. In the current 2012) 305(b) assessment, the most frequently cited suspected causes of impairment include non-native aquatic plants, low DO, mercury, elevated turbidity, and fecal coliform, while most frequently cited suspected sources of impairment include wetland habitat modification, introduction of non-native organisms, atmospheric deposition, unknown sources, on-site treatment systems, natural sources, and agriculture.

Water Quality Monitoring: See Appendix A for water quality details. For each monitoring station in the study area, data for selected parameters was summarized by means of box plots overall and seasonal), quantile plots, and trend analysis. Findings suggest differences in water quality based on habitat, salinity, and season. Low DO is common in the Maurepas Swamp. Pass Manchac is experiencing increased marine influence.

Future Without-Project Conditions No Action Alternative

Direct and Indirect Impacts: There would be no direct impacts. DO and salinity gradient trends are expected to continue. Without a project there would be an increased risk of damage from storm surge resulting from hurricane and tropical storm events in the area. Drainage of storm waters containing elevated nutrients, metals, and organics into water bodies connected to the Maurepas Swamp and Lake Maurepas is a possibility Farris et al. 2007). Without the proposed project, the area would still be affected by the following:

- Restoration and Other Efforts – the LCA CBRD project (USACE 2010a) has the potential to locally reduce salinity stress and improve DO. Multiple diversion projects throughout the Pontchartrain Basin may concurrently have the potential to generate significant changes in wetlands biogeochemistry, some of which may negatively affect wetland plant community resiliency Swarzenski et al. 2005).
- Federal and state water quality programs – may address land use practices in the Mississippi River basin and could impact the area water quality Broussard 2008).
- Coastal processes – the Maurepas Swamp is anticipated to continue to decline and convert to marsh and open water, in turn affecting local water quality conditions.
- Development – development in watersheds affecting the study area.
- Climate change, sea-level and hurricane/tropical storm surge frequency may impact water quality through increased frequency of saltwater intrusion (Mousavi et al. 2011).

2.3 Human Environment (Socioeconomics)

2.3.1 Population and Housing

Historic and Existing Conditions

Table 2-3 shows the population trend in the three-parish area. Population increases between 2000 and 2010 are likely the result of population influx after Hurricane Katrina 2005 . The three parish total population in 2010 was 120,806 residents. The 2012 population in the three parishes declined to 119,161 U.S. Census 2013 due mainly to Hurricane Isaac impacts.

Table 2-3: Parish-wide populations (in 1000s). (U.S. Census 2013)

Parish	1970	1980	1990	2000	2010
St. Charles	29.5	37.5	42.5	48.2	52.8
St. James	19.7	21.6	20.8	21.4	22.1
St. John the Baptist	23.8	32.3	40.1	43.1	45.9
Total	**73.0**	**91.4**	**103.4**	**112.7**	**120.8**

The 2012 study area population totaled 62,900 residents. Housing trends Table 2-4) parallel population growth. Almost all residential and non-residential development is on the higher ground adjacent to the Mississippi River. Major area communities include: Laplace, the largest urban area in the study; Reserve and Garyville in St. John the Baptist Parish; Gramercy and Lutcher in St. James Parish; and Montz in St. Charles Parish. The area was most recently flooded by Hurricane Isaac 2012 storm surge Figure 2-3 and Figure 2-4 .

Table 2-4: Number of households in study area (in 1000s). (U.S. Census 2013)

Parish	1970	1980	1990	2000	2010
St. Charles	7.59	11.6	14.4	16.5	17.2
St. James	4.63	6.1	6.4	7.0	6.9
St. John the Baptist	5.77	9.4	12.7	14.3	15.1
Total	**17.99**	**27.1**	**33.5**	**37.8**	**39.2**

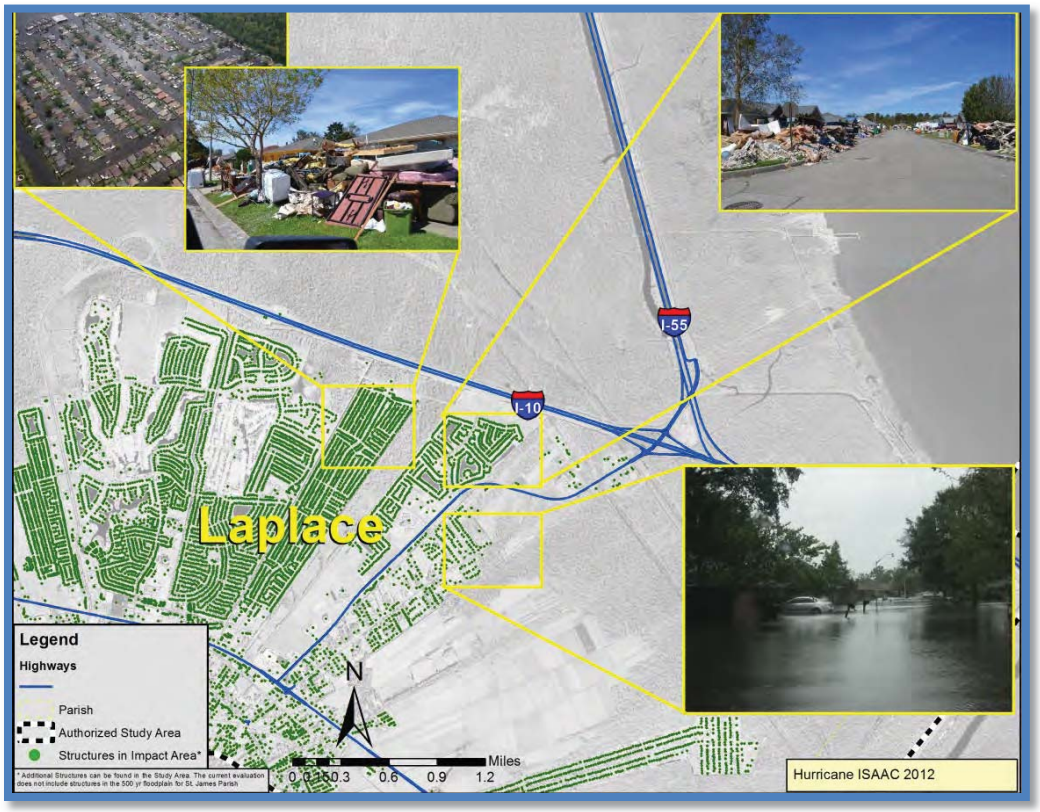


Figure 2-3: Hurricane Isaac storm surge flooding in Laplace.

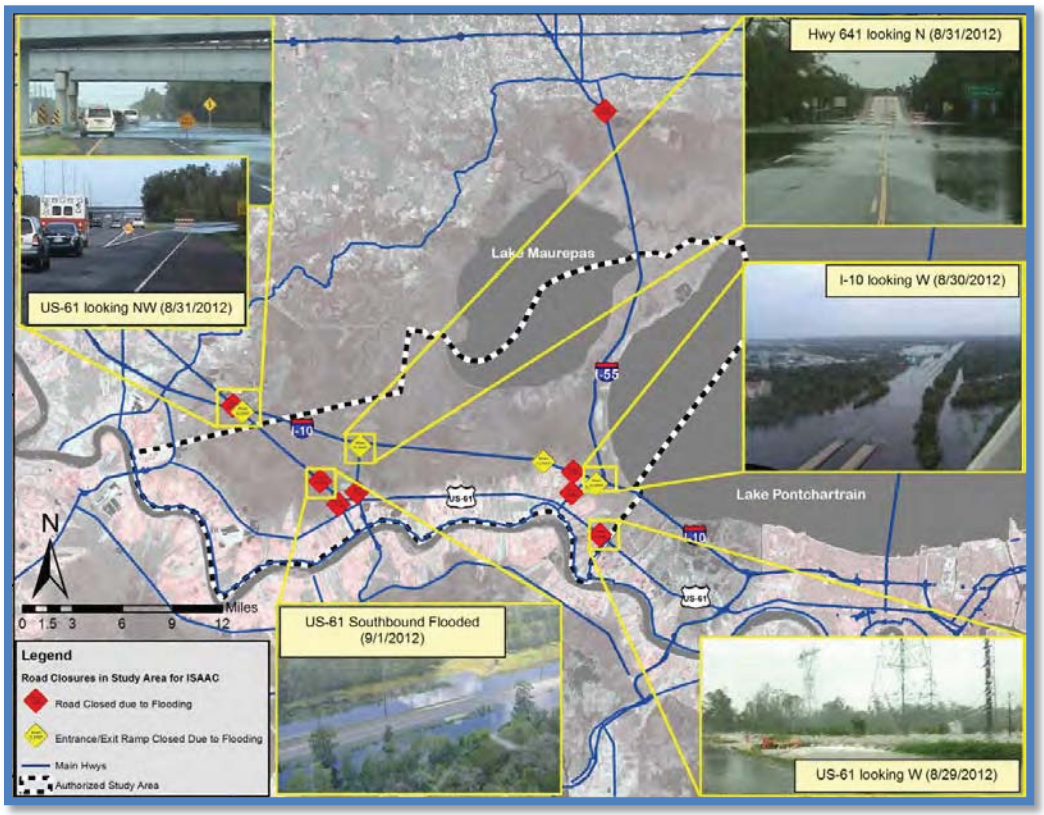


Figure 2-4: Hurricane Isaac storm surge flooding of important transportation routes.

Approximately 20,000 residential structures were inventoried in the study area. Federal Emergency Management Agency FEMA data indicates storm surge and rainfall flood claims for the three parishes were paid between 1978 and 2012 totaling $338,000,000 Table 2-5 . Evaluations conducted for the study showed that under the modeled 100-year storm surge conditions approximately 7,689 structures' first floors would potentially be inundated under the existing conditions. First floor elevations were determined via field approximations Figure 2-5 .

Table 2-5: Summary of parish-wide storm damage insurance payments 1978 through 2012. (FEMA 2013)

Parish	# of Claims	Total Nominal Dollar Amount (in millions)	Average Dollar Amount per Claim
St. Charles	5907	$100.13	$16,950
St. James	135	$1.74	$12,870
St. John the Baptist	4851	$236.18	$48,690
Total	**10898**	**$338.05**	**$31,030**

Future Without-Project Conditions No Action Alternative

Population and housing are expected to follow economic trends in the local, regional, and National economies. An increase of 33,000 residents and approximately 11,000 residential structures are projected. In the absence of hurricane/tropical storm surge damage risk management measures population and housing could be adversely affected.

Evaluations of the future without-project conditions showed that under the modeled 100-year storm surge conditions 14,486 structures' first floors would potentially be inundated under the 2070 intermediate sea level rise conditions Figure 2-6). One or a series of catastrophic hurricane/tropical storm surge events would result in severe negative impacts to residents and cause significant damage to structures. Additionally, residents in these communities could potentially incur higher insurance premiums offered by the National Flood Insurance Program NFIP) should insurance rate maps FIRM be updated to reflect an increase in storm damage risk over time.

Direct and Indirect Impacts: The No Action Alternative would have no direct impacts. Indirect impacts would include a higher potential for permanent displacement of population compared to the proposed alternative as residents relocate to areas with less risk.

2.3.2 Employment, Business, and Industrial Activity (including Agriculture)

Historic and Existing Conditions

Table 2-6 shows the growth of non-farm employment in the three-parish-wide area. Increase in employment is likely the result of the influx of population and businesses after Hurricane Katrina 2005). Leading employment sectors include education, health care and social assistance, manufacturing, and retail. Approximately 1,900 non-residential structures are in the area including: petroleum services and river services companies, Zapp's Potato Chip Factory and the Marathon refinery. Approximately 10 percent of the area 23,800 acres is devoted to agriculture, and about half of these acres are sugar cane crops. This percentage differs from land use percentages described in Table 2-1, which indicates only 543 acres are in agriculture. This apparent discrepancy is because the data was developed for land loss comparisons in the LCA (2004) study; land uses in over 40 percent of the study area were not included.

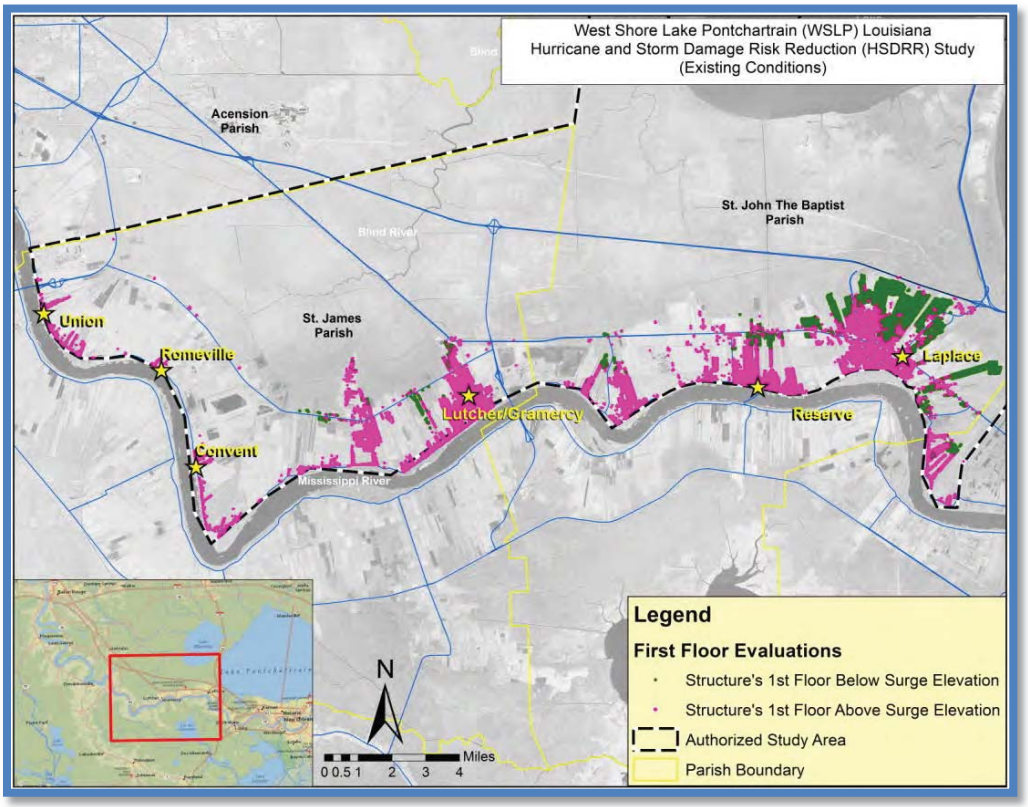


Figure 2-5: First floor evaluations (existing conditions).

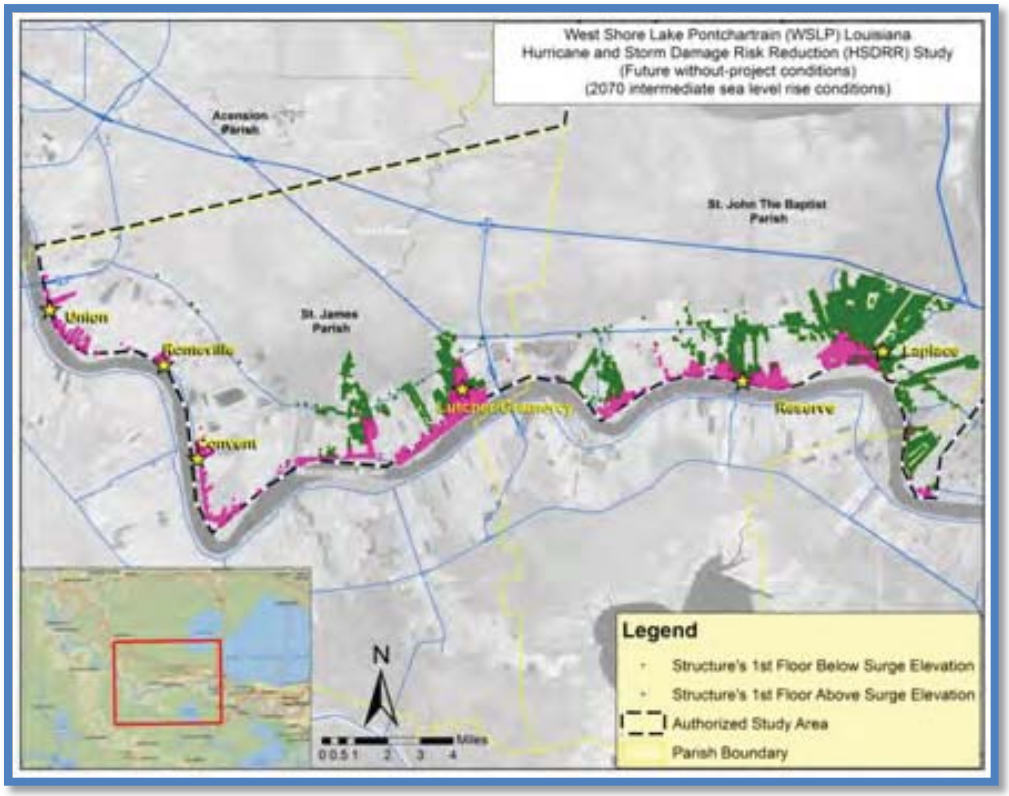


Figure 2-6: First floor evaluations (future without-project conditions).

Table 2-6: Historical parish-wide non-farm employment (in 1000s). (Moody's 2013)

Parish	1970	1980	1990	2000	2010
St. Charles	9.0	18.1	18.5	20.1	24.3
St. John the Baptist	5.4	9.8	9.4	7.6	8.1
St. James	4.2	9.4	11.0	13.4	15.0
Total	**18.5**	**37.2**	**39.0**	**41.1**	**47.4**

Future Without-Project Conditions No Action Alternative

Growth in employment, business and industrial activity is expected to follow economic trends in the local, regional, and National economies. An additional 22,790 jobs are projected by the year 2080. However, without flood risk management alternatives, the stability of employment, business and industrial activity could be adversely affected. One or more catastrophic hurricane/tropical storm surge events could result in severe negative impacts to employment and business activity and cause significant damage to non-residential structures. Additionally, business owners in these communities could potentially incur higher flood insurance premiums should the FIRMs be updated to reflect an increase in flood risk over time.

Direct and Indirect Impacts: The No Action Alternative would have no direct impacts. Indirect impacts would include a higher potential for temporary interruption or permanent displacement of employment, business, and industrial activity as businesses temporarily or permanently relocate to areas with less storm damage risk.

2.3.3 Public Facilities and Services

Historic and Existing Conditions

Public facilities and services have historically grown to meet population demands. The area includes a mixture of community centers, schools, hospitals, police, and fire protection. An airport, technical college, and facilities associated with the Port of South Louisiana are located in the area. During the threat of hurricanes and severe storms public buildings are occasionally used for shelter. A total of 402 public and quasi-public buildings were inventoried to calculate damages in the three-parish area in 2012.

Future Without-Project Conditions No Action Alternative

Public facilities and services are expected to grow with the needs of the population and would follow growth trends. In addition to the 402 public and quasi-public buildings, an additional 165 such facilities are projected by 2070. These facilities would be more susceptible to damages resulting from hurricane/tropical storm surge events. The increased risk of damage to public facilities and the resulting temporary and/or permanent relocation of these facilities would have a negative impact on services.

Direct and Indirect Impacts: There would be no direct impacts. Indirect impacts would include a greater potential for permanent displacement of public facilities and services due to hurricane/tropical storm surge events.

2.3.4 Transportation

Historic and Existing Conditions

Transportation infrastructure includes major roads and navigable waterways that have developed historically to meet the needs of the public. I-10, an east-west route connecting New Orleans and Baton Rouge, crosses the northern part of the area and is a primary hurricane evacuation route. US-61, another evacuation route through the project area, is located south of I-10 and is the northern boundary of the local industrial sector in the area. Most of I-10 and US-61 are either just below or just above the 100-year floodplain. Other major highways in the

project area include I-55, which runs north-south and intersects I-10 in the northeastern portion of Laplace; US-44, which is located in the southern portion of the project area and runs parallel to the Mississippi River; and US-51, which runs north-south through Laplace and parallels I-55.

Other modes of transportation in the project area include water transport along the Mississippi River via vessels and barges, rail, and aviation via the St. John the Baptist Parish airport. Of the three railroads in the project area, two are owned by Canadian National Railroad and one is owned by Kansas City Southern Railroad.

During Hurricanes Ike and Isaac portions of US-61, I-10, and the I-10/I-55 interchange were inundated by a combination of storm surge and rainfall (Table 2-7). This interfered with emergency service access and prevented local and regional residents from returning to their primary residence. This delay in re-population equates to higher emergency costs during storm events, due to the longer time periods required for sheltering residents until the area is made safe to return. There is also the added travel time and cost for taking alternative routes during re-population following tropical storm events.

Travel from Baton Rouge to New Orleans typical takes approximately 1.5 hours without traffic delays. If access routes are congested this extends to two hours (Table 2-8 . Most of the alternative routes are on local roads. Traffic congestion on local roads could extend travel time.

Table 2-7: Mean height (elevation) of major hurricane evacuation routes.

Highway Reach	Mean Height (ft. NAVD 88)	Length (miles)	Type
I-10 Laplace Area	**5.42**	**3.76**	**4 lanes divided**
I-10 Reserve Canal Underpass to Mississippi Bayou	7.58	0.88	4 lanes divided
I-10 Mississippi Bayou to Hope Canal	7.91	3.39	4 lanes divided
I-10 Hope Canal to Gramercy Exit	8.28	2.30	4 lanes divided
I-10 Gramercy to Blind River	7.66	1.80	4 lanes divided
I-10 Blind River to Bayou Conway	7.64	2.53	4 lanes divided
US-61 Last Reach	**5.65**	**0.65**	**4 lanes divided**
US-61 Last Reach to Pipeline	5.78	1.55	4 lanes divided
US-61 Pipeline to Boatclub	5.72	1.84	4 lanes divided
US-61 Boatclub to Canal	6.14	0.98	4 lanes divided
US-61 Low area	**5.51**	**1.12**	**4 lanes divided**
US-61 Low area to Gramercy	6.15	0.21	4 lanes divided
US-61 Gramercy Exit	**6.28**	**3.21**	**2 lanes**

*Reaches shown in **bold** flooded during Hurricane Isaac.

Future Without-Project Conditions No Action Alternative

Transportation infrastructure would be more susceptible to damages resulting from hurricane/tropical storm surge events. There would be an increased risk that access to infrastructure would be reduced due to storm surge.

Direct and Indirect Impacts: With no action there would be no direct impacts. Indirect impacts would include a higher potential for damages to transportation infrastructure in the area as a result of hurricane/tropical storm surge events, coupled with the interruption of use by emergency responders and residents.

Table 2-8: Potential transportation impacts.

Scenario	Typical Travel Distance between BR and NOLA	Average Travel Time* between BR and NOLA	Additional Travel Distance from Scenario # 1	Average Additional Travel Time from Scenario # 1	Comments
Scenario #1: No Impacts	83.90 miles	1.43 hours	-	-	-
No access to I-10	96.30 miles	1.70 hours	12.40 miles	16 mins	No exit to Laplace Area
I-10 impacted between Laplace and Belle Terre exits	87.50 miles	1.60 hours	3.60 miles	10 mins	4 lane local highway ~ 13 stop lights
I-10 impacted between Gramercy/Lutcher and Belle Terre exits	88.60 miles	1.67 hours	4.70 miles	14 mins	4 lane local highway ~ 19 stop lights
I-10 impacted between Sorrento and Gramercy/Lutcher exits	89.90 miles	1.63 hours	6.00 miles	12 mins	4 lane local highway ~ 20 stop lights
I-10 and US-61 impacted thru Maurepas Swamp	91.70 miles	1.83 hours	7.80 miles	24 mins	2 lane local roadway >20 stop lights

BR Baton Rouge. **NOLA** New Orleans; travel times are based on number of lanes, distances and speed limits. Road conditions (e.g. traffic density) were not factored into calculations.

2.3.5 Community and Regional Growth

Historic and Existing Conditions

Community and regional growth are influenced by National trends, but depend significantly upon local attributes. Table 2-9 shows per capita income growth since 2000 in the area. Growth has been aided by the flood risk reduction provided by the MR&T levee system.

Table 2-9: Parish-wide per capita income. (U.S. Census 2013 and Moody's 2013)

Parish	1990	2000	2010	2012
St. Charles	$17,297	$24,228	$32,599	$34,992
St. John the Baptist	$14,231	$18,327	$29,663	$31,492
St. James	$14,440	$19,720	$29,351	$31,349

Future Without-Project Conditions No Action Alternative

Risk reduction from hurricane/tropical storm surges would not be provided for communities in the project area. Property owners in these communities could potentially incur higher flood insurance premiums should FIRMs be updated to reflect an increase over time in the risk of damage from hurricane/tropical storm surge events. While community and regional growth is expected to follow National and local economic trends, increased insurance premiums associated with damage resulting from hurricane/tropical storm surge events could have a negative impact on community and regional growth relative to areas with lower flood insurance premiums.

Direct and Indirect Impacts: With no action there would be no direct impact. Indirect impacts under the No Action Alternative would include a higher potential for less community and regional growth due to increasing risk of damage from hurricane/tropical storm surge events.

2.3.6 Tax Revenues and Property Values

Historic and Existing Conditions

Damages from hurricane/tropical storm surge events can significantly impact business, industries, farms, property values, local employment and income, which then negatively impacts the tax base created by these activities. Reduction in the risk of damages from hurricane/tropical storm surge events can have a commensurate positive impact on tax revenues and property values. Conversely, the lack of reduction of risk of damages from hurricane/tropical storm surge events in areas highly susceptible to these damages could limit the growth of tax revenues and property values.

Residential 19,958) and non-residential 1,882) structures were inventoried to calculate potential storm-related damages. The median value of owner-occupied housing units are $175,200 in St. Charles Parish, $114,000 in St. James Parish, and $148,800 in St. John the Baptist Parish. Future losses to these properties will tend to reduce tax revenues.

Future Without-Project Conditions No Action Alternative)

Growth in tax revenues and property values are expected to follow local, regional and National economic trends. However, without storm surge damage risk reduction management measures, the economic stability, tax revenues and property values could be adversely affected. Community residents could incur higher storm damage flood insurance premiums should FIRMs be updated to reflect an increase over time in the risk of damage from hurricane/tropical storm surge events. Higher insurance premiums could negatively affect property values.

Direct and Indirect Impacts: There would be no direct impacts under the No Action Alternative. Indirect impacts could include lower tax revenues as property values decline due to high risk of damage from storm surge events and residents and businesses relocate to lower-risk areas.

2.3.7 Community Cohesion

Historic and Existing Conditions

Community cohesion is based on the characteristics that keep the members of the group together long enough to establish meaningful interactions, common institutions, and agreed upon ways of behavior. These characteristics include race, education, income, ethnicity, religion, language, and mutual economic and social benefits. The project area, which was originally settled in the 1700s, is comprised of communities with established public and social institutions including places of worship, schools, and community interaction.

The construction of water resource projects can impact community cohesion in different ways. For example, prior to the Great Flood of 1927, the area was subject to periodic riverine flood damage events from the Mississippi River. However, with the construction of the MR&T levee system, the risk of inundation from the river has been greatly reduced and the community cohesion of the area was positively impacted.

The area remains highly susceptible to storm surge damage. In August 2012, communities in St. John the Baptist Parish, including the town of Laplace, were inundated by the storm surge from Hurricane Isaac. The study area does not currently have a hurricane or storm surge damage risk reduction system in place. Hence, following Hurricane Isaac, local populations where temporarily forced to relocate thereby disrupting community cohesion.

Future Without-Project Conditions No Action Alternative

The area will become more susceptible to damage caused by hurricane/tropical storm surge events that is projected to increase over the period of analysis. The increased risk of damage to

residential and non-residential structures and the resulting temporary and/or permanent relocation of populations would negatively affect the community cohesion in many communities.

Direct and Indirect Impacts: There would be no direct impacts. Indirect impacts would include a higher potential for a reduction in community cohesion if the civic infrastructure in the area continues to be damaged as a result of hurricane/tropical storm surge events. Community cohesion may be reduced if residents and businesses relocate to lower-risk areas.

2.3.8 Environmental Justice

Analysis of Environmental Justice EJ) used census tracts and block groups to obtain a more accurate estimate of the demographics in the study area, which primarily falls on the East bank of the Mississippi River. St. James, a portion of St. Charles, and St. John the Baptist Parishes are considered the reference communities of comparison. Overall parish reference demographics were compared to the census tracts and block groups demographics for the following: the towns of Gramercy, Lutcher, Grand Point and Convent in St. James Parish; the town of Montz in St. Charles Parish; and the towns of Laplace, Reserve and Garyville in St. John the Baptist Parish. The potential for EJ concerns arise in instances where the percent minority 50 percent) and/or low-income 20 percent population in a census tract or block group is greater than those in the reference community the entire parish). To analyze communities in the project area, the team used 2010 U.S. Census records. Community outreach activities included conducting small neighborhood meetings and circulation of informational flyers. This methodology is consistent with E.O. 12898.

Historic and Existing Conditions: The study area includes residential, commercial, industrial and undeveloped land. The above referenced towns include predominantly minority and/or low-income populations which have received additional outreach efforts per the requirements of E.O. 12898. Tables 2-10, 2-11 and 2-12 show the percent minority and low-income for communities that could be potentially impacted by the proposed action.

Table 2-10: St. James Parish communities percent minority and low income.

	St. James Parish*	Gramercy	Lutcher	Grand Point	Convent
Total Population	22,102	3,613	3,559	2,473	711
% Minority	53%	49%	54%	27%	69%
% Low Income	15%	13%	21%	8%	10%
Census Tract	N/A	N/A	LA093040200	N/A	N/A
Census Block Group s	N/A	LA0930401001	LA0930402001 LA0930402002 LA0930402003 LA0930402004	N/A	N/A

***Includes total parish population demographics.**

Table 2-11: St. Charles Parish communities percent minority and low income.

	St. Charles Parish*	Montz
Total Population	52,880	1,918
% Minority	35%	22%
% Low Income	13%	0%
Census Tract	N/A	N/A
Census Block Group s	N/A	N/A

***Includes total parish percent minority and low income.**

Table 2-12: St. John the Baptist Parish communities percent minority and low income.

	St. John the Baptist Parish*	Laplace	Reserve	Garyville
Total Population	45,824	29,872	9,766	2,811
% Minority	61%	59%	65%	
% Low Income	15%	9%	20%	
Census Tract	N/A	LA095070400 LA095070500 LA09507900 LA095071000	LA095070500 LA095070700 LA095070800	LA095070600
Census Block Group s	N/A	LA0950703003 LA0950709001	LA0950705001 LA0950707001 LA0950707002 LA0950707003 LA0950707005 LA0950708001 LA0950708002	LA0950706001 LA0950706002

***Includes total parish percent minority and income.**

The communities of Lutcher, Convent, Laplace and Reserve have minority populations of 54 percent, 69 percent, 59 percent and 65 percent, respectively. These communities include a greater percentage of minorities relative to the State and Parish levels. However, they also represent a majority of the population in the study area. Hence, these communities would not be disproportionately impacted by the proposed action. Communities that have low-income populations at or above 20 percent include: Lutcher 54 percent minority and Reserve 65 percent minority . Because these communities have high minority and low-income populations, they have been identified for further outreach efforts per E.O. 12898.

Future Without-Project Conditions No Action Alternative

Direct and Indirect Impacts: There would be no direct impacts. Indirect impacts include continued degradation, under a low RSLR scenario, of wetlands between Lakes Maurepas and Pontchartrain and communities on the east bank of the Mississippi River. These wetlands provide a buffer from hurricane and storm surge risk to minority and low-income residents in the area. Under the no action alternative, residents would continue to incur costs associated with damages to structures, utilities and the local economy following major storm events.

While the area includes a predominantly minority and/or low-income population, there are non-minority and non-low income populations dispersed throughout. People living and working in the area, irrespective of race or income, would be impacted by storm surge events in the future without project condition. There would likely be disproportionate impacts on low-income residents in a mandatory evacuation due to the lack of financial resources. Federal, state, parish and local programs are available to assist all residents in the rebuilding process after storms.

2.4 Natural Environment

2.4.1 Soils, Water Bottoms and Prime and Unique Farmlands

Historic and Existing Conditions: Soils are hydric and non-hydric. Most of the undeveloped area is forested wetlands/swamp habitat comprised of the Barbary-Sharkey soil association. The Convent-Silty alluvial land association is found immediately along the Mississippi River. The Commerce-Sharkey soil association is primarily found on agricultural and undeveloped lands. Convent-Commerce-Sharkey soil association and Convent-Barbary soil association are typically found in undeveloped and rural/suburban/urban developed areas, respectively (USDA 2013 .

Water bottoms include Lakes Maurepas and Pontchartrain; the Mississippi and Blind Rivers; Mississippi Bayou and Bayou Fusil; parish canals, such as the Reserve Relief Canal, Hope Canal, and Godchaux Canal; and shallow swamp, ponds and sloughs. Lakes Pontchartrain and Maurepas, and the Mississippi River are state water bottoms. Because of the typical stagnant swamp conditions, the loss of sediment inputs, reduced primary productivity, and limited consolidation, net phosphorus and organic matter export from the swamp is likely low. Therefore, support for dependent systems downstream e.g., Lake Maurepas) is likely limited and substantially reduced from historic levels USACE 2010b).

Historically, forested wetlands, swamps and associated water bottoms were typically subjected to flooding and drying events. Water bottoms provided an outwelling of organic matter (Odum 1980) and a sink for phosphorus and nitrogen that supported the health of downstream ecosystems in Lake Maurepas Lane et al. 2003). However, cessation of near annual Mississippi River floods has limited the capacity of these functions and services.

Approximately 44,672 acres, or 24.2 percent, of the study area meet the soil requirements for prime farmland NRCS 2013). Not all of these soils are presently utilized for agricultural purposes. In addition, these acres and percentage differ from agricultural land use acres and percentage described in Table 2-1 which indicates only 543 acres are in agriculture. This apparent discrepancy is because Table 2-1 was developed for land loss comparisons in the LCA 2004) study. Nevertheless, this is the only readily available land use information for the area. As such the analysis does not include land uses in over 40 percent of the study area, as indicated in Table 2-1. Unique farmland is not located in the study area. Prime farmland is limited to natural ridge tops and consists of the following soil associations: Cancienne silt loam, Cancienne silty clay loam, Carville silt loam, Gramercy silty clay, Schriever clay, and Vacherie very fine sandy loam. Not all of prime farmlands in the study area are used for agriculture. Crops include mainly common bermudagrass, improved bermudagrass, soybeans, wheat, sugar cane, bahiagrass, and corn. Hydrologic conditions and regulations may prevent some of these areas from functioning to prime capacity. Coordination with the Natural Resources Conservation Service regarding prime farmlands has been completed Appendix A).

Borrow material for this project could come from the Bonnet Carré Spillway area between the Mississippi River and Airline Highway or alternative borrow sources not yet identified. The Bonnet Carré Spillway area has been used as a Government Furnished borrow source since 1985. The area has been disturbed by sand haulers maintaining the Spillway, and existing borrow pits are scattered throughout the area. Use of the Bonnet Carré potential borrow site is documented in the 2007 “Final Phase I Environmental Site Assessment, Bonnet Carré Borrow Area, North of Airline Highway, St. Charles Parish, Louisiana.”

Future Without-Project Conditions No Action Alternative

Direct and Indirect Impacts: There would be no direct impacts. Existing conditions and changes in the future would persist. The area and the known proposed borrow site would continue to experience changes in RSLR that could potentially affect the spatial limits, depths and frequency of inundation to existing wet hydric) and non-wet non-hydric soils in low lying areas. Existing non-hydric soils could be converted to hydric type soils, and existing hydric soils could become permanent water bottoms as swamp habitats are converted to open water. Portions of the area and the Maurepas Swamp could be permanently inundated under both the intermediate and high RSLR scenarios (Table 2-2). Prime farmlands could be converted to other uses.

Under both the intermediate and high RSLR scenarios (Table 2-2), soils would likely remain

nutrient poor, exhibit atypically low bulk densities for forested wetlands due to insufficient sediment content, and exhibit a corresponding loss in soil bearing capacity. There would be continued degradation and conversion of forested wetland and swamp habitats to marsh and open water. Saltwater intrusion from Lakes Maurepas and Pontchartrain during storms would continue. Degradation and conversion of existing swamp habitats hydric soils) to water bottoms would likely continue resulting in less accretion and continued subsidence. Decomposition of swamp vegetation would initially increase the availability of nutrients and detritus. However, the continued conversion of fresh swamp to marsh and eventually to shallow open water would ultimately decrease available nutrients and detritus for the Maurepas Swamp system.

2.4.2 Vegetation Resources

Historic and Existing Conditions

The area includes forested wetlands, swamps, estuarine emergent wetlands, and submerged aquatic vegetation SAV). Land cover and habitat analysis is displayed in Figure 2-1. These quantities are based upon the USGS land loss data analysis from the LCA Study 2004) and do not represent land cover or habitats for the entire study area. Hence, the 543 acres 0.29 percent) of agricultural/pasture grassland is not representative of the entire study area. Wetlands in the area provide protection from wave action, erosion, and storm damage and offer various consumptive and non-consumptive recreational opportunities.

Vast virgin stands of bald cypress-tupelo swamp habitat once stretched from the bottomlands of north Louisiana to the Gulf of Mexico Conner and Day 1976). The Maurepas Swamp was vegetated by an expanse of old growth, freshwater forested swamp that extended as far as 26 miles north from the Mississippi River to the Baton Rouge-Denham Springs fault line. The area was subjected to extensive logging through the 1930s. Remnant logging railroad embankments and canal system used to extract the harvested timber has resulted in increased land loss. Consequently, existing forested wetlands and swamp habitats in the area are rapidly converting to fresh marsh and shallow open water habitats due to impounding, saltwater intrusion, and a lack of nutrient and sediment inputs. This habitat shift has caused a significant loss of wetland functions, including loss of forested wetlands/swamp habitats for wildlife and aquatic species, recreational opportunities, aesthetics, and storm surge protection. To address these forested wetland losses the CBRD and the Maurepas Swamp diversion studies were authorized for study or construction and have made restoration of the most severely degraded portions of the swamp a National priority.

Forested wetlands/swamp and bottomland hardwood forest BLH) typical dominant and co-dominant species include bald cypress, water tupelo, green ash, swamp red maple, blackgum, diamond oak, black willow, southern wax myrtle buttonbush and Chinese tallow. BLH species in the project area include: swamp red maple, green ash, swamp tupelo, and various oak species. Swamp red maple and green ash typically comprise the sub-dominant mid-story Beyer et al. 1906, Conner and Day 1976). Scrub species, including black willow, wax myrtle, and buttonbush are sporadically present in areas with diminished canopy cover. Detailed descriptions of common area plants are presented in LCA USACE 2004, 2010a and 2010b .

SAV communities were historically dominated by native species such as fanwort, coontail, small pondweed, bladderwort, water nymph, widgeon grass, and wild celery. Native SAV communities are largely confined to areas of higher flows, including natural waterways and natural cuts into the swamp interior. Shallow water habitats with insufficient flow may be choked with floating vegetation, greatly limiting light penetration into the water column. SAV are an important food source and habitat for both aquatic organisms and terrestrial wildlife. SAV provides structure and habitat for many invertebrates that are food for various life stages of fish. SAV also provides

food for waterfowl and feeding habitat for fish-eating birds such as herons and egrets.

Invasive plants include water hyacinth, alligatorweed, hydrilla, common salvinia, giant salvinia, Chinese tallow, and Chinese privet. These invasive species compete with native flora for resources such as nutrients and light, community structure and composition, and ecosystem processes. Water hyacinth, common salvinia, giant salvinia, and hydrilla all limit the amount of light penetrating the water column. This impacts plankton biomass production. Alligatorweed, Chinese tallow and Chinese privet are of minimal wildlife value and can proliferate until nearly monocultural stands exist, limiting food available for wildlife.

The Louisiana Natural Heritage Program database identifies the following threatened and endangered species and rare, unique or imperiled vegetative communities in the area: cypress-tupelo swamp rare or unique habitats, the bald eagle, alligator snapping turtles, osprey, paddlefish, manatee, swamp milkweed, floating antler fern and rooted spike-rush LDWF 2013 .

Future Without-Project Conditions No Action Alternative
Direct and Indirect Impacts: There would be no direct impacts. Existing conditions and trajectories of ecological change to area vegetation would persist. Undeveloped vegetated lands, including wetlands, would continue to be lost to development. Wetlands along major highways would continue to be lost to development as seen along Belle Terre Boulevard in Laplace, and areas north of US-61. Forested wetlands/swamp, BLH and associated sub-canopy species that would be enclosed by the proposed action would continue to be subjected to saltwater intrusion and subsidence, but to a lesser degree. Forested wetlands/swamps would continue to convert to marsh and open water USACE 2010a and 2010b .

Much of the area, as well as portions of the Maurepas Swamp could be permanently inundated under the intermediate and high RSLR scenarios likely further changing existing habitats. The area would continue to be subjected to increases in RSLR which could increase the geographic extent of saltwater intrusion, potentially convert vast areas of existing forested wetlands and swamp habitats to marsh and eventually open water. There could also be a shift from fresh water dominant species to species that can tolerate higher salinity.

Degradation and loss of forested wetland and swamp habitats will accelerate the decline in interdependent processes of plant production and habitats used by various biota necessary for a stable ecosystem. The moderation of storm surge provided by cypress-tupelo swamp and the contribution of vertical accretion to offset subsidence would be lost.

2.4.3 Wildlife Resources

Historic and Existing Conditions: Table 2-13 shows the status, functions of interest, trends, and projections from 1985 through 2050 for avifauna, furbearers, game mammals, and reptiles in the area (adapted from LCWCRTF WCRA 1999).

Birds: Area wetlands have historically supported an abundance of neotropical and other migratory and non-migratory birds. Diving ducks, seabirds, rails, coots, and gallinules have preferred the open water habitats of Lake Maurepas and the West Manchac Land Bridge, while wading birds typically utilize fresh swamp habitats in the area. The area also supports the recently de-listed Endangered Species) bald eagle and colonial nesting waterbird e.g., herons, egrets, ibis, night-herons, and roseate spoonbills) rookeries. Since 1985, most bird species and species groups in the area have exhibited either increasing or stable populations in the area.

Area forested wetlands, swamp, BLH, and other wetlands provide birds and wildlife with shelter,

nesting, feeding, roosting, cover, nursery, and other life requirements. Wetlands provide neotropical migrants with essential stopover habitat on annual migrations Stouffer and Zoller 2004, Zoller 2004 . The greatest threat is habitat loss American Bird Conservancy 2009). Bottomland hardwood forests provide critical bird breeding habitat Wekeley and Roberts 1996).

Mammals: Since 1985, furbearer populations have typically remained stable across the Upper Pontchartrain Basin LCWCRTF WCRA 1999 . Rabbits have experienced declines in the Amite/Blind and West Manchac Land Bridge mapping units, as have squirrels in the West Manchac Land Bridge mapping unit. However, squirrels have remained steady throughout the remainder of the area, whereas deer populations have increased. The West Indian manatee, federally-listed as an endangered species, is known to occur or occasionally enter the area.

Reptiles: Due to the ecological and economic importance of the American alligator, historical and current figures on population numbers are available. In contrast, data on other reptiles in the area is unavailable. LDWF survey data from 1996 to 2000 shows alligator nest densities in the area are classified as medium approximately 1 nest per 250 acres . Alligator spotlight surveys in the Maurepas Swamp from June to August 2006 found that alligator density, and especially the density of large alligators, appeared to increase with proximity to Lake Maurepas Fox et al. 2007 . There are at least four lizard species, 16 snake species, and 9 turtle species documented in bald cypress-tupelo swamps of southern Louisiana Dundee and Rossman 1989). The lack of recorded evidence obscures accurate historic and existing conditions for other reptile species that are known or are likely to have inhabited the Maurepas Swamp.

Amphibians: The bald cypress-tupelo ecosystem supports a wide variety of frogs, toads, and salamanders. Abundant water, shelter, and food resources enable several species to thrive. At least 13 frog and toad species and six salamander species inhabit this community type in south Louisiana. Amphibians are often exceptional indicators of wetland ecosystem health. Limited information exists on historic and existing population trends of area amphibians. In a study on similar habitat located in close to the area, Tinkle 1954) observed numerous amphibian species over the course of a year. Literature accounts and museum specimens suggest the presence of pig frogs Dundee and Rossman 1989) in Ascension and St. James parishes.

Invasive Wildlife Species: Prior to the introduction of nutria to Louisiana in 1930s USGS 2000, Baroch et al. 2002), no invasive wildlife species were known to be present. A substantial population increase of nutria is attributed to the decline in the price of pelts in 1989 USGS 2000, Baroch et al. 2002 . Areas of extensive nutria damage, or “eat outs,” alter the composition and habitat type of wetland communities USGS, 2000). Aerial surveys estimated 80,000 acres of marsh in the State of Louisiana were damaged by nutria Keddy et al. 2007). Throughout the Maurepas Swamp, nutria eat seedling cypress and other forested wetland and swamp tree species preventing regeneration (USACE 2010a).

Future Without-Project Conditions No Action Alternative

Direct and Indirect Impacts: There would be no direct impacts. Existing conditions and associated changes into the future would persist. Continued human encroachment and development would result in loss of existing wildlife wetland habitats. The area would be subjected to increases in RSLR which could increase saltwater intrusion and exacerbate ongoing conversion of existing forested wetland and swamp habitats to marsh and open water USACE 2010a, USACE 2010b). The area and the Maurepas Swamp could be inundated to some unknown extent, under both the intermediate and high RSLR scenarios, thereby potentially reducing available forested wetland and swamp wildlife habitat.

Table 2-13: Status, functions of interest, trends, and projections from 1985 through 2050 for avifauna, furbearers, game mammals, and reptiles with the study area. (LCWCRTF & WCRA 1999)

Mapping Unit	1988 Habitat Type	% of	Avifauna: Bald Eagle Func.	Status	Trend	Proj.	Wading Birds Func.	Status	Trend	Proj.	Dabbling Ducks Func.	Status	Trend	Proj.	Diving Ducks Func.	Status	Trend	Proj.	Raptors Func.	Status	Trend	Proj.	Rails, Coots, and Gallinules Func.	Status	Trend	Proj.
Amite/Blind	FS	73	Ne	Hi	I	I	Ne	Hi	I	Sy	Mu	Lo	Sy	Sy		NH				NH				NH		
	HF	21		NH				NH			Mu	Lo	Sy	Sy		NH				NH				NH		
West Manchac Land Bridge	OW	6		NH				NH			W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Lo	Sy	Sy
	FM	22		NH			Mu	Hi	I	Sy	W	Lo	D	D	W	Lo	D	D	Mu	Lo	Sy	Sy	Mu	Lo	D	D
	FS	61		NH			Ne	Hi	I	Sy	W	Lo	Sy	Sy		NH			Mu	Mo	I	Sy		NH		
	HF	11		NH				NH			W	Lo	Sy	Sy		NH			Mu	Hi	I	D		NH		
East Manchac Land Bridge	OW	7		NH				NH			W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Lo	Sy	Sy
	IM	41		NH			Mu	Hi	I	Sy	W	Lo	D	D	W	Lo	D	D	Mu	Lo	Sy	Sy	Mu	Lo	D	D
	FS	15		NH			Ne	Hi	I	Sy	W	Lo	Sy	Sy		NH				NH				NH		
	HF	34		NH				NH			W	Lo	Sy	Sy		NH				NH				NH		

Mapping Unit	1988 Habitat Type	% of	Avifauna (cont.): Other Marsh/OW Func.	Status	Trend	Proj.	Other Woodland Func.	Status	Trend	Proj.	Other Marsh/OW Func.	Status	Trend	Proj.	Other Woodland Func.	Status	Trend	Proj.	Furbearers: Nutria Func.	Status	Trend	Proj.	Muskrat Func.	Status	Trend	Proj.
Amite/Blind	FS	73	Ne	Lo	Sy	Sy	Ne	Mo	I	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	HF	21		NH			Ne	Hi	I	D		NH			Mu	Mu	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
West Manchac Land Bridge	OW	6	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	FM	22	Ne	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	FS	61	Ne	Lo	Sy	Sy	Ne	Mo	I	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	HF	11		NH			Ne	Hi	I	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
East Manchac Land Bridge	OW	7	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	IM	41	Ne	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	FS	15	Ne	Lo	Sy	Sy	Ne	Mo	I	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	HF	34		NH			Ne	Hi	I	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy

Mapping Unit	1988 Habitat Type	% of	Furbearers (cont.): Mink, Otter, and Raccoon Func.	Status	Trend	Proj.	Game Mammals: Rabbits Func.	Status	Trend	Proj.	Squirrels Func.	Status	Trend	Proj.	Deer Func.	Status	Trend	Proj.	Reptiles: American Alligator Func.	Status	Trend	Proj.
Amite/Blind	FS	73	Mu	Lo	Sy	Sy	Mu	Lo	D	D	Mu	Lo	Sy	D	Mu	Mo	I	D	Mu	Mo	I	I
	HF	21	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	D	Mu	Mo	I	Sy	Mu	Lo	Sy	Sy
West Manchac Land Bridge	OW	6	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	I
	FM	22	Mu	Lo	Sy	Sy	Mu	Lo	D	D		NH			Mu	Lo	Sy	D	Mu	Mo	I	I
	FS	61	Mu	Lo	Sy	Sy	Mu	Lo	D	D	Mu	Lo	D	D	Mu	Mo	Sy	D	Mu	Mo	I	I
	HF	11	Mu	Lo	Sy	Sy	Mu	Lo	D	D	Mu	Mo	D	D	Mu	Mo	Sy	D	Mu	Lo	Sy	Sy
East Manchac Land Bridge	OW	7	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	I
	IM	41	Mu	Lo	Sy	Sy	Mu	Lo	D	D		NH			Mu	Lo	Sy	D	Mu	Mo	I	I
	FS	15	Mu	Lo	Sy	Sy	Mu	Lo	D	D	Mu	Lo	D	D	Mu	Lo	Sy	D	Mu	Mo	I	I
	HF	34	Mu	Lo	Sy	Sy	Mu	Lo	D	D	Mu	Mo	D	D	Mu	Lo	Sy	D	Mu	Lo	Sy	Sy

Habitat Types: FS = Fresh Swamp; HF = Hardwood Forest; OW = Open Water, FM = Fresh Marsh, IM = Intermediate Marsh. Habitat types comprising less than 5% of unit are shown only if habitat type is particularly rare or important to wildlife.

Status: NH = Not Historically Present; NL = No Longer Present; Lo = Low Numbers; Mo = Moderate Numbers; Hi = High Numbers.

Functions of Particular Interest: Ne = Nesting; St = Stopover Habitat; W = Wintering Area; Hi = High Numbers; Mu = Multiple Functions.

Trends since 1985) / **Projections** (through 2050): Sy = Steady; D = Decrease; I = Increase; U = Unknown.

Migratory neotropic avian species currently utilize the area as migratory stopover habitat. As forested wetlands and swamp habitats are lost, there would be a corresponding reduction in overall species diversity and abundance.Most mammalian, amphibian and reptilian species would be required to relocate to more suitable swamp habitats. There could be an increase in the population and distribution of nutria due to the conversion of swamp into open water and marsh which are the preferred habitats by nutria.

Future Without-Project Conditions No Action Alternative
Direct and Indirect Impacts: There would be no direct impacts. Existing conditions and associated changes into the future would persist. Continued human encroachment and development would result in loss of existing wildlife wetland habitats. The area would be subjected to increases in RSLR which could increase saltwater intrusion and exacerbate ongoing conversion of existing forested wetland and swamp habitats to marsh and open water USACE 2010a, USACE 2010b). The area and the Maurepas Swamp could be inundated to some unknown extent, under both the intermediate and high RSLR scenarios, thereby potentially reducing available forested wetland and swamp wildlife habitat. Migratory neotropic avian species currently utilize the area as migratory stopover habitat. As forested wetlands and swamp habitats are lost, there would be a corresponding reduction in overall species diversity and abundance. Most mammalian, amphibian and reptilian species would be required to relocate to more suitable swamp habitats. There could be an increase in the population and distribution of nutria due to the conversion of swamp into open water and marsh which are the preferred habitats by nutria.

2.4.4 Aquatic and Fisheries Resources

Historic and Existing Conditions: Plankton and benthic organisms serve as the lowest food resource level for many species of fish and shellfish. Plankton can often be used as an indicator of benthic, nutrient, and water quality health Stone et al. 1980). Like plankton, benthic invertebrate communities are also good indicators of ecological health. Because many benthic organisms are sessile or have limited mobility, they cannot move away from environmental stressors and therefore community profiles reveal information about the environment's health Porrier et al. 2009). There is little information available on plankton communities in Lake Maurepas and the upstream Maurepas Swamp waterbodies. Data available for Lake Maurepas suggests the dominance of Anabena, dinoflagellates, diatoms, and cyanobacteria with occasional strong presence of chlorophytes Atilla et al. 2007 .

Benthic macroinvertebrates tend to dominate deepwater swamp invertebrate communities. Characteristic species include crayfish, clams, oligochaete worms, snails, freshwater shrimp, midges, amphipods, and various immature insects Mitsch and Gosselink 1993 . One of the main functions of a benthic community is secondary production, the conversion of plant material by benthic detritivores and herbivores to animal tissue, thereby forming major links in the aquatic food web between plants and predators. Compared to other habitat types, bald cypress-tupelo wetlands may support higher invertebrate densities.

Limited data exists on benthic communities in the area. Species present are likely typical of deepwater forested wetlands and slow-flowing rivers in the region. However, the increased duration of inundation and the low flow and exchange due to impoundment have promoted a system characterized by low DO levels and limited drawdown of water levels to below surface elevations. These conditions likely have resulted in reduced diversity of benthic organisms. Species composition has likely shifted towards species more tolerant of low DO levels, such as oligochaetes and midges. Reduced soil bulk densities and changes in average particle size, texture, and organic content due to low sediment input may further influence habitat suitability

and species presence (Day et al. 1989). Within Blind River, woody debris introduced from the adjacent swamp may provide suitable substrate for invertebrates to colonize and thus support benthic community diversity.

The Maurepas Swamp benthic community is seasonally abundant. Typically, winter months have higher DO concentrations when water temperatures are cooler. Organisms found in winter include a variety of segmented and flatworms, snails, crustaceans, and insects. During summer, when lower DO is present, the benthic community is sparse. Air-breathing insects and crustaceans; a few tubificid oligochaetes and dipterans, which can tolerate lower oxygen conditions; and crawfish, especially burrowing crawfish, may be found. During periods when the swamp floor dries, these organisms survive through the resistance stages eggs, cocoons, etc. and repopulate the area when water returns to the swamp Loden 1978).

Salinity strongly influences species composition of invertebrate communities. Higher abundance of benthic organisms has been associated with decreasing salinity from saline to freshwater sites in Louisiana Philomena 1983 . Invertebrate species vary in the range of salinity within which they can survive and their tolerance to fluxes Day et al. 1989). The Maurepas Swamp, Blind River, and the bayous and canals in the area are primarily freshwater, but salinity intrusion can occur. Throughout the area higher salinity occurs during drought years Shaffer et al. 2003 . The relatively low salinity of these waters provides transitional habitat for freshwater fish and provides nursery and foraging habitat for marine fish and shellfish. Freshwater fish, such as largemouth bass, sunfish, catfish, and crappie are taken by recreational fishermen LDWF 2009, Hastings 2001). Crawfish and crabs may be harvested from the swamp Fox et al. 2007).

A survey from January 1976 to August 1977, Watson et al. 1981) sampled fish species at six locations along Blind River from south of US-61 to Lake Maurepas. The 57 species of finfish collected included 12 estuarine, 43 freshwater, one catadromous and one anadramous species. Freshwater species were dominant both spatially and temporally. Finfish diversity appeared to be higher at the lower stretches of Blind River, below the Amite River Diversion Canal and closer to Lake Maurepas. Multiple studies have been conducted on diversion projects in the area. Data from these studies show an overall decrease in the number of taxa collected. However, different sampling gear and sample locations could explain the trends. Additionally, an overall a trend toward less freshwater species collected is evident Fox et al. 2007).

Fox et al. 2007) sampled fish at 20 locations in the Maurepas Swamp. There were 26 taxa collected with a total of 1,425 individuals. Spotted gar and striped mullet were dominant species making up 76.5 percent of all fish. Physiochemical data was collected as well, study (Fox et al. 2007) ranged from 1.52 to 6.25, and species richness ranged from 2 to 12 species, indicating a very variable community. Lower diversity, evenness and richness were observed in the interior, in areas of low flow, low DO and low pH. Most of the species specific analyses were consistent with known habitat preferences. For example, spotted gar was negatively correlated with high surface DO levels. This species can breathe air, and it is usually found in hypoxic areas.

Future Without-Project Conditions No Action Alternative

Direct and Indirect Impacts: There would be no direct impacts. Existing conditions and associated changes into the future would persist. The area would be subjected to increases in RSLR which could increase saltwater intrusion and lead to increases in and the potential conversion of vast areas of forested wetlands and swamp habitats to marsh and open water. Much of the area, as well as the Maurepas Swamp could be permanently inundated under both the intermediate and high RSLR scenarios. There could be a shift from fresh water dominate species to those species that can tolerate higher salinity.

2.4.5 Essential Fish Habitat (EFH)

Historic and Existing Conditions: Table 2-14 and Figure 2-7 show two EFH species and their likely occurrence in the area by life stage. Blind River and various bayous and canals in the Maurepas Swamp provide EFH, including nursery, foraging, and spawning and breeding grounds. Aquatic and wetland habitats in the area include estuarine emergent wetlands, submerged aquatic vegetation, mud substrates, and estuarine water column. These provide EFH for white shrimp and red drum. Waterbodies and wetlands provide nursery and foraging habitats for a variety of fish, some of which may serve as prey for other fish species designated as EFH species e.g., mackerel, snapper, and grouper) and highly migratory fishes e.g., billfish and sharks). The area also provides foraging and nursery habitat for economically important marine fishery resources including striped mullet, Atlantic croaker, blue crab, and Gulf menhaden. The area is important for Federal and state-managed species. It provides foraging and nursery areas for prey species (gulf menhaden and bay anchovy (Penland et al. 2002) eaten by predators, such as sand seatrout, spotted seatrout, catfish and crappie (LDWF 2009, Hastings 2001 , and highly migratory species.

Table 2-14: Essential Fish Habitat for life stages of species in Lake Pontchartrain.

Species	Life Stage (occurrence in project area)	Essential Fish Habitat Zone and Habitat Type
White Shrimp *Litopenaeus setiferus*	Adult (rare	Near shore and offshore sand/shell, and soft bottoms.
	Juvenile common to abundant	Estuarine emergent marshes and soft bottoms.
Red Drum *Sciaenops ocellatus*	Adult common to rare)	Estuarine SAV, soft bottoms, sand/shell and emergent marshes. Near shore pelagic and sand/shell, and hard bottom habitat used for spawning. Offshore sand/shell and hard bottom .
	Juvenile common to rare)	Estuarine SAV, soft bottoms and near shore sand/shell, and hard bottom.

(GMFMC 2004, NMFS 2013b, USACE 2008, NMFS 2009)

Future Without-Project Conditions No Action Alternative

Direct and Indirect Impacts: There would be no direct impacts. Existing conditions and associated changes into the future would persist. The area and the Maurepas Swamp could be inundated to some unknown extent, under both the intermediate and high RSLR scenarios, thereby potentially increasing the extent of saltwater intrusion that could potentially convert existing EFH nursery swamp habitats to marsh and open water EFH.

2.4.6 Threatened and Endangered Species

Historic and Existing Conditions

A complete list of threatened and endangered species and critical habitats in the project area is presented in USACE 2010a) and USACE 2010b). Two threatened and endangered species, the Gulf sturgeon *Acipenser oxyrhynchus desotoi* and the West Indian manatee *Trichechus manatus* , and one delisted species, the bald eagle *Haliaeetus leucocephalus* , are known to occur or occasionally enter the area. There are no threatened or endangered plants in the area. The area is also known to support colonial nesting waterbirds e.g., herons, egrets, and others . The USFWS personal communication, USFWS January 9, 2009) provided recommendations for minimizing disturbance to colonies containing nesting wading birds during construction. The USFWS recommended that on-site contract personnel be informed of the need to identify

colonial nesting birds and their nests, and to avoid affecting them during the breeding season. The recommendations will be followed to the maximum extent practicable.

West Indian Manatee: Substantial food sources (submerged or floating aquatic vegetation) have not been observed in the area. Given the extensive areas of relatively undisturbed wetlands in the region and the paucity of food sources in the project area, it is considered unlikely for the manatee to frequent and utilize the inshore waters of Lake Maurepas and Pontchartrain as habitat, although manatees could pass through this area while transiting the lake.

Gulf Sturgeon: The area is not Gulf sturgeon critical habitat.

Bald Eagle: The bald eagle was delisted as a federally threatened species for most of the United States; however, it is protected under the Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act. Habitats suitable for use by the bald eagle are present in St. Charles, St. John the Baptist and St. James Parishes, and occurrences of the bald eagle have been recorded there. The bald eagle is known to nest and forage in the Maurepas WMA personal communication, Ms. Brigette Firmin, USFWS on May 10, 2013). According to USFWS maps depicting active and inactive eagle nests, all active nests are beyond 1,500 feet from the proposed project construction sites. The USFWS considers this sufficient distance not to be of concern for potential impacts by construction activities.

Future Without-Project Conditions No Action Alternative
Direct and Indirect Impacts: There would be no direct impacts on threatened or endangered species, or their designated critical habitats, bald eagles or colonial nesting waterbirds. The Gulf sturgeon and the West Indian manatee, along with the bald eagle, would continue to

occasionally enter the project area. The West Indian Manatee has been infrequently sited near the project area. Continued conversion of forested wetlands and swamp habitat to marsh and open water would provide more favorable conditions for the Gulf Sturgeon and the West Indian Manatee, but would provide only foraging habit for the bald eagle and colonial nesting waterbirds. As forested wetlands and swamp habitats are lost, there would be a corresponding reduction in overall species diversity and abundance.

2.4.7 Cultural and Historic Resources

Historic and Existing Conditions**:** Eight cultural units are used to characterize the prehistoric cultural sequence in southeast Louisiana: Paleo-Indian 10000–8000 B.C.), Archaic 8000–1000 B.C.), Poverty Point 1700–500 B.C.), Tchefuncte 500 B.C.–A.D. 100), Marksville A.D. 100–500), Baytown A.D. 400–700), Coles Creek A.D. 700–1200 and Mississippian/Plaquemine A.D. 1200–1700 . Historic perspectives generally cover the colonial period to approximately 1764, Acadian migration to the area, end of the Colonial period, the Antebellum period, the Civil War, late 19th century reconstruction, and the early 20th century.

The majority of the area contains few cultural resources, although not all areas have been adequately examined for that possibility, especially along natural waterways. The area contains natural levee of the Mississippi River, where numerous historic cultural resources, such as plantation buildings, have been recorded. Although cultural resources surveys have crossed many portions of the project area, undiscovered cultural resources may still exist.

Plantation properties that overlap the area include 16AN30 (Tezcuco Plantation) and 16AN31 Monroe Plantation), 16SJB8 Belle Point Plantation), 16SJB10 Laplace Plantation , 16SJB12 Sunnyside Plantation), 16SJ11 Hester Plantation), 16SJ12 St. Elmo Plantation), 16SJ20 Wilton Plantation , 16SJ21 Helvetia Plantation), 16SJ30 Colomb Plantation), 16SJ34 St. Rose Plantation), 16SJ49 Rapidan Plantation), 16SJ37 Welham Plantation). These often contain outbuildings or components to a plantation operation, and may cover several acres.

Less definable cultural resources located within lands protected by the artificial Mississippi River Levee include 16SC54, 16SC79, 16SJB8, 16SJB66, 16SJ19, 16SJ29, 16SJ64. The site identified as 16SJ1 is a National Register of Historic Places NRHP) prehistoric site located in agricultural lands, and 16SJ50 and 16SJ51 are additional prehistoric sites that may be contemporaneous and related to site 16SJ1. Further sites include 16SJ5, 16SJ7, 16SJ9, 16SJ15, 16SJ16, 16SJ18, and 16SJ57 that have been determined as ineligible for the NRHP.

Cultural sites on the Mississippi River batture includes 16SJ13, 16SJ31, 16SJ39, and sites 16SJ41 – 16SJ48 that are ineligible for the NRHP. Site 16SJ38 has remnants of the Bourbon Plantation sugar house. Cultural resources in the Maurepas Swamp include parts of rail lines and water crossings used for logging 16SJ71, 16SJ72, 16SJ73 . Other recorded resources includes two historic coffins 16SJ58, 16SJ61) eroded from a cemetery probably associated with 19th-20th century Blind River hunting camps. Recorded resources along the shores of Lake Maurepas, Lake Pontchartrain, or waterways include 16SJB4, 16SJB33, NRHP site 16SJB2, the Schloesser Cemetery 16SJB3), and remnant civil war fortifications (16SJB7).

Future Without-Project Conditions No Action Alternative)

Direct and Indirect Impacts: No direct impacts to cultural and historic resources would occur. Indirect impacts would be the continuation of existing conditions. Changes in RSLR could affect the spatial limits, depths and frequency of inundation to existing cultural and historic resources.

2.4.8 Aesthetics and Visual Resources

Historic and Existing Conditions**:** Aerial photography between 1992 and 2010 shows visual conditions of the area changed over 20 years. The landscape along with view sheds has changed due to development, the conversion of swamps into marsh and open water. Photographs show that the same public thoroughfares that are in place today were in place in 1992; however, the scenery has changed from natural to a more developed state with residential, commercial and industrial development dominating US-61, Louisiana Highway 51 LA-51) and LA-44, and other corridors. The only major exception is I-10, which traverses the area, giving near unobstructed views of a native landscape that remains aesthetically pleasing. Primary view sheds then, as they are today, were best taken from the local road system, and, in some instances, the Mississippi River levee.

There are two Scenic Streams in or near the area. Blind River stretches south 25 miles from Lake Maurepas, crossing under I-10 and ending near US-61 on the west side of the area. Bayous LaBranche and Trepagnier are located to the east outside of the study area sourcing from Lake Pontchartrain and stretching south, crossing under I-10 and US-61 and ending near the Norco Bayou Tepagnier) and Good Hope Bayou LaBranche). Other water resources include the Mississippi River, and numerous canals, streams and creeks that crisscross the native habitat between I-10 and the developed areas along the river LDWF 2013).

> *"Blind River's surrounding habitat is composed almost entirely of deep, wooded swamp with Spanish moss draped bald cypress and water tupelo being the dominant plant species. The habitat exhibits moderate plant species diversity and moderately high animal diversity. Natural levees and spoil banks provide the only upland habitat available near the river."*

Scenic Byways include the Great River Road traversing US-61. This is but one segment to an overall scenic byway that stretches on multiple thoroughfares from Canada to the Gulf of Mexico. It is state and Federally designated and also has an "All American Road" status, making it significant in culture, history, recreation, archeology, aesthetics and tourism.

Future Without-Project Conditions No Action Alternative

Direct and Indirect Impacts: There would be limited to no direct impacts to visual resources. Visual resources would most likely evolve from existing conditions in a natural process, or change as dictated by future land use maintenance practices and policies.

2.4.9 Recreation Resources

Historic and Existing Conditions

The area includes the 103,263-acre Maurepas Swamp WMA. There are a few private camps in the WMA. The LDWF estimates that there were 22,673 WMA recreation users in 2012. Access into the WMA area is generally by boat; however, several locations provide foot access. Consumptive recreation includes hunting deer, squirrels, rabbits and raccoons; fishing for bass, sunfish and crappie; and trapping alligators and nutria. Non-consumptive recreation includes bird watching, sightseeing, and boating. There is a 0.5 mile nature trail and two tent-only camping areas. There is one private recreational camp in the alternative levee alignments.

Many canals and bayous traverse the area, including Pipeline, Hope, Grand Point, and Reserve Relief Canals; and Mississippi and Manchac Bayous. Blind River is one of the most used waterways in the WMA. Recreation includes boating, fishing, hunting, and crawfishing. There is a public boat launch (Hope Canal) in the WMA. There are boat launches near the WMA boundary providing access into the WMA, including Tchakenhou Bayou, Ruddock Canal, Reserve Relief, and St. James Boat Club launch. Additionally, the St. James Boat Club boat

launch, funded by the Land and Water Conservation Fund, provides access to Blind River. It includes playground facilities and is used as the Choupique Rodeo Site. Three launches access the I-55 canal. There are no designated parking lots; parking occurs along the highway. The canal provides access to Lake Maurepas. A launch is located at the end of Peavine Road to access Lake Pontchartrain. Three launches are located off US-61, I-55, and I-10. The US-61 launch provides access to Conway Canal and Old New River. The I-55 and I-10 boat launches provide access to adjacent canals and Lake Maurepas.

Cajun Pride Swamp Tours is located off Frenier Road near US-51. This commercial operation provides boat tours in their private refuge and in the Manchac Swamp. Belle Terre Country Club and Golf Course is located in the area. This provides various recreational facilities including a golf course, outdoor swimming pool, and tennis courts. There are local recreational parks including Regala Park, Montz Park, Bethune Park, and Laplace Recreation and Youth Organization Larayo) Youth Park. Regala Park facilities include an outdoor swimming pool, softball/baseball fields, picnic pavilions, tennis courts, playground, racquetball courts, 1 mile walking path, and soccer field. Montz Park provides a 1,561-foot walking path, baseball fields, basketball courts, playground, and picnic pavilions. Bethune Park provides baseball fields and as does Larayo Youth Park which also provides tennis courts and a swimming pool.

Future Without-Project Conditions No Action Alternative
Direct and Indirect Impacts: There would be no direct impacts. Recreational infrastructure would remain vulnerable to surges. Parks, boat launches, and golf courses could be damaged. Storm surge and salt water could have a negative impact on freshwater forests and habitats and could reduce recreational resources (e.g., fishing, hunting, bird watching, and other .

2.4.10 Noise

Historic and Existing Conditions**:** Noise, or unwanted sound, may be objectionable in terms of the nuisance, health, or well-being effects it may have upon humans and the human environment, as well as upon animals and ecological systems Kryter 1994). Generally, noise is a localized phenomenon. The regulations for Occupational Noise Exposure 29 CFR §1910.95 under the Occupational Safety and Health Act of 1970, as amended, establishes a means for effective coordination of Federal activities in noise control and to provide information to the public regarding noise emissions. There are many different noise sources throughout the area including commercial and recreational boats, and other recreational vehicles; automobiles and trucks, and all terrain vehicles; aircraft; machinery and motors; and industry-related noise.

Future Without-Project Conditions No Action Alternative)
There would be no direct, indirect or cumulative impacts.

2.5 Cumulative Impacts for the Future Without Project Condition

Cumulative impacts would be the incremental direct and indirect impacts of not implementing a storm risk reduction system for each of the significant resources described above in addition to the direct and indirect impacts attributable to other storm damage risk reduction systems which have not and would not be implemented in the Pontchartrain Basin, Louisiana and the Nation. There is little, if any, published data with which to provide a quantitative comparison regarding proposed hurricane/tropical storm damage risk reduction projects which have not been implemented. Primary cumulative impacts would include the incremental effects of not providing hurricane/tropical storm damage risk reduction. These would be localized and would affect different parts of the area:

- an estimated 62,900 residents and 20,000 residential structures in the area;
- an estimated 70,190 non-farm jobs; 1,900 non-residential structures; 23,800 farm acres;

- projected 165 public and quasi-public facilities;
- transportation infrastructure;
- effects community and regional growth;
- the effects on tax revenues and property values;
- community cohesion effects, especially during hurricane and storm surge events;
- potential effects of not providing risk reduction to minority and low income populations;
- potential degradation and or loss of cultural and historic resources;
- the continued loss of wetland habitats due to human development and conversion of existing forested wetlands and swamp habitats to marsh and open water; and
- potential salt water intrusion and inundation during hurricane and storm surge events.

Figure 2-8: Hurricane Isaac flooding in the River Forest subdivision in Laplace, Louisiana.

3.0 PLAN FORMULATION

Plan formulation is the key to supporting the USACE Civil Works water resources development mission. It is a process requiring experience, analysis, intuition and inspiration. To ensure that sound decisions are made, the process requires a systematic and repeatable approach. The Principles and Guidelines describe the study process for Federal water resource projects. It requires the systematic formulation of alternative plans that contribute to the Federal objective.

3.1 Prior Studies

This study builds upon prior reports and plans. Area problems and opportunities are documented in these reports. Table 3-1 lists relevant reports and studies.

Table 3-1: Relevant prior reports and studies.		Relevance to WSLP Study				
	Comprehensive Planning Studies	Data Source	Consistency	Structural Measures	Non-Structural Measures	FWOP Conditions
1980	LA Coastal Resources Program	X	X	X	X	X
1999	Coast 2050: Toward a Sustainable Coastal LA	X	X	X	X	X
2004	LA Coastal Area (LCA), LA Ecosystem Restoration Study	X	X	X	X	X
2012	LA's Comprehensive Master Plan for a Sustainable Coast	X	X	X	X	X
	Related Hurricane and Flood Damage Risk Reduction Projects and Reports					
1927	"Flood Control, Mississippi River and Tributaries" Published as House Document 90, 70th Congress 1st Session	X	X	X	X	X
1965	Chief of Engineers Report on Lake Pontchartrain and Vicinity, LA Hurricane Protection Project	X	X	X		X
1967	Amite River and Tributaries, Comite River Basin, LA	X	X	X		X
1984	Chief of Engineers Report on Lake Pontchartrain and Vicinity, LA Hurricane Protection Project	X	X	X		X
1990	LA Coastal Area Mississippi River Delta Study	X	X	X		X
1994	LA Coastal Wetlands Restoration Plan	X	X	X	X	X
1994	Southeast LA Hurricane Preparedness Study	X	X	X	X	X
2010	LCA Ecosystem Restoration Study, Volume II of VI, Final Integrated Feasibility Study and Supplemental Environmental Impact Statement for the Amite River Diversion Canal Modification Ascension and Livingston Parishes, LA	X	X	X	X	X
2010	LCA Ecosystem Restoration Study, Volume IV of VI , Final Integrated Feasibility Study and Supplemental Environmental Impact Statement for the LCA Small Diversion at Convent/Blind River St. James Parish, LA	X	X	X	X	X
	Previous West Shore Lake Pontchartrain Reports					
1985	West Shore Lake Pontchartrain Initial Evaluation Report	X	X	X		X
1987	Lake Pontchartrain West Shore, LA Hurricane Protection Reconnaissance Report	X	X	X		X
1997	West Shore Lake Pontchartrain, LA Hurricane Protection Project, Reconnaissance Report	X	X	X		X
2003	St. John the Baptist Parish, LA East Bank Urban Flood Control Reconnaissance Report	X	X	X		X

3.2 Planning Constraints

Plans are formulated to achieve objectives. **Objectives** and **constraints** are linked to problems and opportunities. Constraints are restrictions that limit the extent of the planning process.

Planning Constraints

1. Minimize impacts to wetlands.
2. Minimize impacts to the Small Diversion at Convent/Blind River project and River Reintroduction into Maurepas Swamp project.
3. No loss of flood protection from existing flood damage reduction projects.
4. Minimize impacts to the Maurepas Swamp Wildlife Management Area and surrounding wetlands.
5. Minimize infrastructure impacts (pipelines, highways, hospitals, schools, fire stations, and police stations).

3.3 Management Measures Considered and Screened (*NEPA required)

A **management measure** is a feature a *structural element* that requires construction or assembly on-site) or an activity a *non-structural action*) that can be implemented at a specific geographic site to address one or more planning objectives. They can be used individually or combined with other management measures to form alternative plans. Measures were developed to address problems and to capitalize upon opportunities. They were derived from a variety of sources including prior studies, the public scoping process, and the team.

This study considered structural measures and non-structural measures to provide risk reduction and maximize project benefits. All measures were screened for capability to meet objectives and avoid constraints, for engineering and economic feasibility, and for the level of risk reduction provided over the period of analysis 2020 to 2070). Measures that warranted continued consideration were assembled into **alternative plans**. Below are the structural and non-structural measures that were considered. Those measures carried forward for further consideration are shown in blue boxes. Figure 3-1 illustrates some of these measures. Detailed information about the measures and screening process can be found in Appendix E.

Non-Structural Measures

- **Full Acquisition/Buy-out**: This measure would involve the relocation of residents outside of the floodplain by physically moving structures or by purchasing replacement structures. An acquisition program would reduce flood vulnerability and decrease future flood damages. *Carried forward for further consideration.*
- **Limited Acquisition/Buy-out**: This measure would remove structures that receive repetitive damages from high frequency storm events 1 year, 5 year, 10 year, and 25 year frequencies . *Carried forward for further consideration.*
- **Flood-proofing and Elevation**: This measure would raise residential structures above the 2070 floodplain and flood-proof other structures, such as public facilities, to reduce damages. *Carried forward for further consideration.*
- **Floodplain Management Measure**: This measure would update local floodplain zoning rules based on changes due to RSLR. *Carried forward for further consideration.*
- **Cypress Reforestation**: This measure would enhance and/or restore forest on the Maurepas Landbridge and in the Maurepas Swamp to reduce surge heights. *Eliminated from consideration because it would be ineffective in reducing the level of risk reduction.*
- **Flood Forecast and Warning Measures**: This measure would involve more robust flood forecasting and warning systems. *Eliminated from consideration because the area has an ample forecast/warning system provided by local government. NOAA, FEMA,*

and the USACE already take the responsibility of producing storm surge maps under existing floodplain management authorization.

Structural Measures

- **Levees/Floodwall**: This measure would reduce storm surge damages. *Carried forward for further consideration.*
- **Control Structures on Canals and Bayous**: This measure involves the placement of control structures on canals and bayous to reduce the risk of flood damages. *Carried forward for further consideration.*
- **Seawall**: This measure would construct a seawall along the rim of Lakes Maurepas and Pontchartrain. *Eliminated because it would have adverse environmental impacts by enclosing swamp, and would stop drainage systems by preventing water exchange with Lake Maurepas. Mitigation features for this measure would not be cost effective.*
- **Floodgates on Tidal Passes**: This measure would place a large tide control structure on Pass Manchac, and potentially North Pass, to prevent storm surge from entering the area. *Eliminated from consideration because it would have adverse impacts on the environment and drainage systems by restricting tides and limiting the ability of the upper basin to drain during storms. The mitigation features would be cost prohibitive. Additionally, it would be ineffective due to surge flanking.*
- **Highway/Levee**: This measure would raise the I-10 roadbed to serve as a levee to reduce risk of surge damage. *Eliminated from consideration because it would require massive changes to the highway system, and would require replacement of the highway during scheduled levee lifts.*

3.4 Initial Array of Alternatives (*NEPA required)

Structural Measures were combined into an **initial array of 12 alternative plans**. These plans started in the eastern portion of the study area, and were incrementally expanded to the west. Maps and detailed descriptions of each of the alternative plans can be found in Appendix E.

- **Plan 1**: Levees/floodwalls from the Bonnet Carré Spillway to Reserve Canal.
- **Plan 2**: Levees/floodwalls from the Bonnet Carré Spillway to East St. John High School.
- **Plan 3**: Levees/floodwalls from the Bonnet Carré Spillway to East St. John High School following the wetland/non-wetland interface.
- **Plan 4**: Levees/floodwalls from the Bonnet Carré Spillway to East St. John High School offset from I-10.
- **Plan 5**: Levees/floodwalls from the Bonnet Carré Spillway to Marathon.
- **Plan 6**: Levees/floodwalls from the Bonnet Carré Spillway to Reserve enclosing US-51.
- **Plan 7**: Levees/floodwalls from the Bonnet Carré Spillway to Marathon following the wetland/non-wetland interface.
- **Plan 8**: Levees/floodwalls from the Bonnet Carré Spillway to Ascension Parish/Mississippi River.
- **Plan 9**: Levees/floodwalls from Bonnet Carré Spillway to Hope Canal/Mississippi River.
- **Plan 10**: Levees/floodwalls from the Bonnet Carré Spillway to the Hope Canal/Mississippi River enclosing I-10.
- **Plan 11**: Levees/floodwalls from the Bonnet Carré Spillway to the Hope Canal/Mississippi River with pipeline avoidance.
- **Plan 12**: Levees/floodwalls from the Bonnet Carré Spillway to Ascension Parish enclosing I-10.

Figure 3-1: Typical levee, floodwall (T-wall) and control structure.

To determine if the plans were viable for further evaluation each plan was scored from 5 high performing to 1 low performing based on how well it met objectives and avoided constraints. The scores were totaled and the plans were compared, evaluated and screened.

After reviewing the aggregate scores, Plans 1 - 6 were eliminated from further consideration because they did not maximize the planning objectives. Plans that could induce flooding to communities outside of the risk reduction system or divided communities were eliminated from consideration because they were considered unacceptable.

Plan 7 and Plan 9 alignments followed the wetland/non-wetland interface through St. John the Baptist Parish. However, Plan 7 would not provide risk reduction to the town of Garyville. By increasing the length of the levee by 500 feet, Plan 9 provided risk reduction to Garyville while only minimally increasing costs. Plan 7 was thus eliminated. Plan 8 and Plan 12 would provide risk reduction to the same area. The difference between the two Plans was the tie-in points at the two closest high ground areas to prevent storm surge from flanking the levee. Plan 12 would extend into Ascension Parish and tie into the Marvin Braud pump station. Plan 8 would tie into LA-70 in St. James Parish adding 4 miles to the alignment. Plan 12 was carried forward instead of Plan 8 because it was less costly and the direct environmental impacts were less than Plan 8.

The four remaining structural plans were carried forward: Plan 9, Plan 10, Plan 11 and Plan 12.

Structural and non-structural measures were combined to form additional plans. A plan was developed to evaluate a stand-alone non-structural plan which would acquire or elevate 14,486 structures in the flood plain. The non-structural plan cost $3,260,000,000 far exceeding estimated benefits and the cost of other alternatives. The stand-alone non-structural plan was eliminated from further evaluation, but it was determined that portions of this plan could be carried forward to complement the remaining structural alignments. After screening the structural plans, the remaining plans Plan 9, Plan 10, Plan 11 and Plan 12) were evaluated to identify if there was a risk of storm surge-related damage that was not addressed by the structural alignments. While Plan 12 would provide risk reduction to most of the developed study area, Plans 9, 10, and 11 would not provide risk reduction to St. James Parish. Additionally, two communities within St. James Parish, Lutcher and Convent, could be considered Environmental Justice communities per Executive Order 12898.

Non-structural measures were added to complement Plans 9, 10, and 11 to address the risk of potential storm surge-related damages to areas west of Hope Canal. With the inclusion of the non-structural measures, Plans 9, 10, and 11 would provide benefits commensurate with Plan 12 Figure 3-2 .

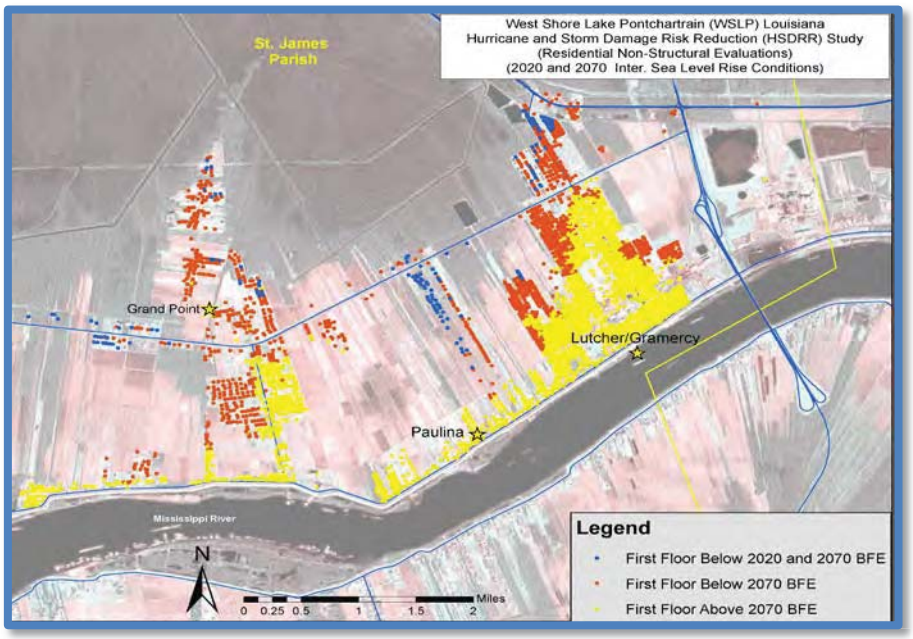


Figure 3-2: Supplemental non-structural plan area in St. James Parish.

The number of structures expected to be impacted by storm surge is highly influenced by RSLR. Under the base condition year 2020 damages in St. James Parish resulting from a 1% annual exceedance probability AEP) storm event would impact approximately 219 structures. This is expected to increase with the effects of RSLR over the 50-year period of analysis to 1,571 structures out of a total of 4,921 structures. Due to the uncertain impacts of RSLR, a range of costs were developed based on a minimum expected number of structures based on the 2020 floodplain and a maximum number of structures based on the 2070 floodplain. During feasibility level design, further analysis on the non-structural features will be conducted by economic reach to determine the economic feasibility of the non-structural features Figure 3-3 .

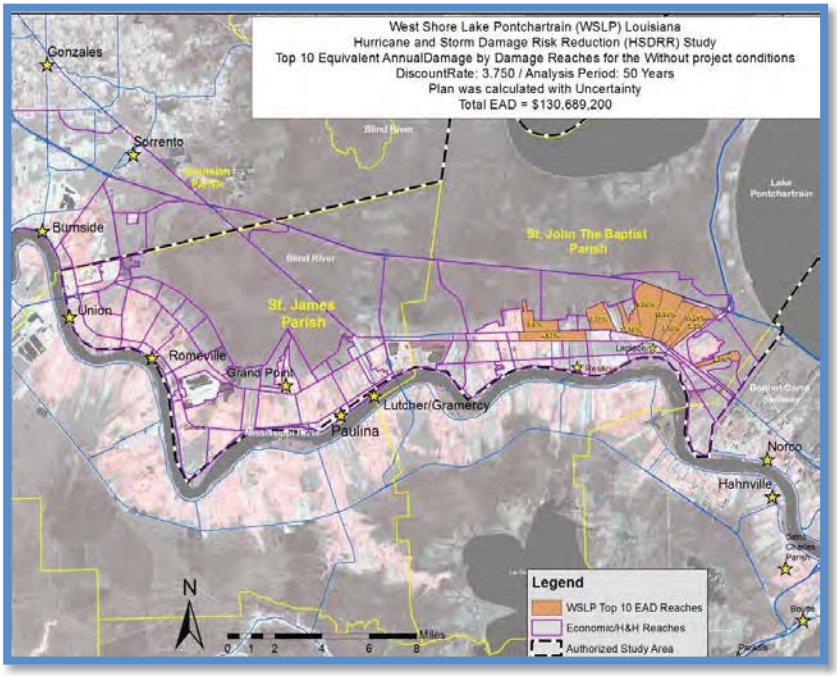


Figure 3-3: Economic reaches, FWOP condition.

Four plans with non-structural measures were carried forward and identified as follows:

Plan 9 + non-structural → **Alternative A**
Plan 10 + non-structural → **Alternative B**
Plan 11+ non-structural → **Alternative C**
Plan 12 → **Alternative D**

These alternatives were further evaluated considering alignments with respect to the I-10 corridor. Alternative B would not provide greater risk reduction for the evacuation routes than any of the other plans. Alternative B would reduce risk to the same number of structures as Alternative C but would enclose approximately 4,000 more acres of wetlands. Based on this, Alternative B was eliminated.

3.5 Final Array of Alternatives (*NEPA required)

The final array of alternatives carried forward for consideration included **the No Action Alternative**, **Alternative A**, **Alternative C**, and **Alternative D** Figure 3-4). Engineering details on each can be found in Appendix B. Comparative details are shown in Table 3-2. The team assumed that Alternatives A, C, and D would provide equal levels of risk reduction. The least costly plan would have the highest net benefits. Analysis is based on a 1% AEP storm event.

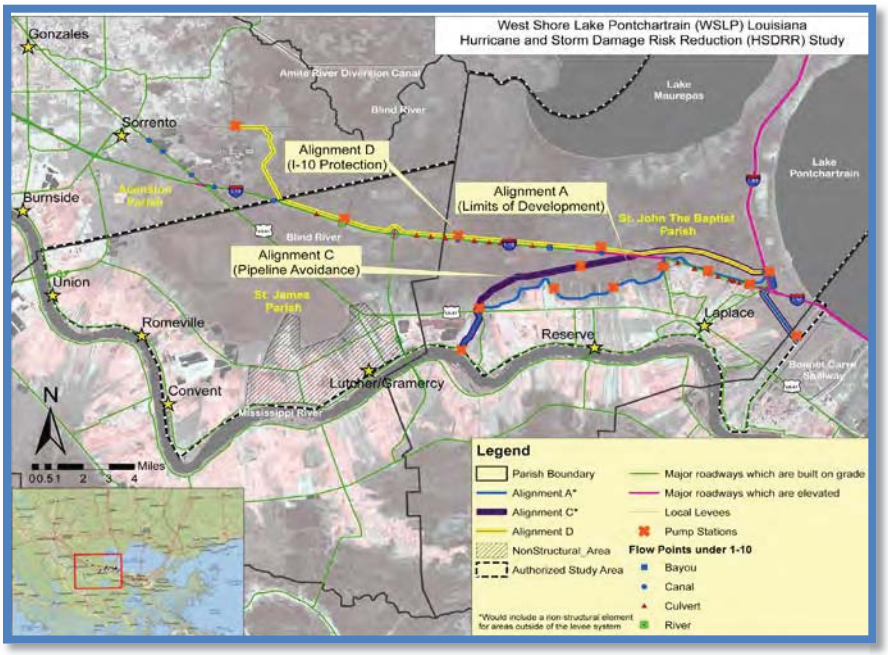


Figure 3-4: Final array of alternative plans.

No Action Alternative (Future without-project condition)

Under the No Action Alternative no risk reduction would occur. The area would continue to experience storm surge damage. This would be exacerbated by RSLR and increased impacts to wetlands due to salinity. As wetlands erode and subside, they would provide less risk reduction.

Table 3-2: Comparative details for final array of alternative plans.

Alternative	Length of Alternative	Size of Study Area Behind Alternative	Number of Structures Behind Alternative	Communities Behind Alternative	Miles of I-10 Behind Alternative	Wetlands Behind Alternative	Number of Pipeline Crossings
A	20 miles	38 sq miles	16,919	Montz, Laplace, Reserve, Garyville	4 miles	~5 sq miles	70
C	18 miles	47 sq miles	16,919	Montz, Laplace, Reserve, Garyville	4 miles	~16 sq miles	36
D	28 miles	160 sq miles	21,840	Montz, Laplace, Reserve, Garyville, Lutcher, Gramercy, Grandpoint	15 miles	~79 sq miles	14

Alternative A: Bonnet Carré Spillway to the Hope Canal to Mississippi River

Alternative A Figure 3-5) would provide risk reduction to St. Charles, St. John the Baptist and St. James Parishes. The approximately 20.41-mile levee and floodwall alignment begins at the West Guide levee of the Bonnet Carré Spillway, north of transmission line and pipeline corridors and extends west around the interstate interchange and along the wetland/non-wetland interface. The alignment turns south near Hope Canal, until it reaches the Mississippi River Levee MRL). Elevation and/or acquisition of structures outside of the alignment would reduce risk of storm surge-related damage in areas west of the Hope Canal.

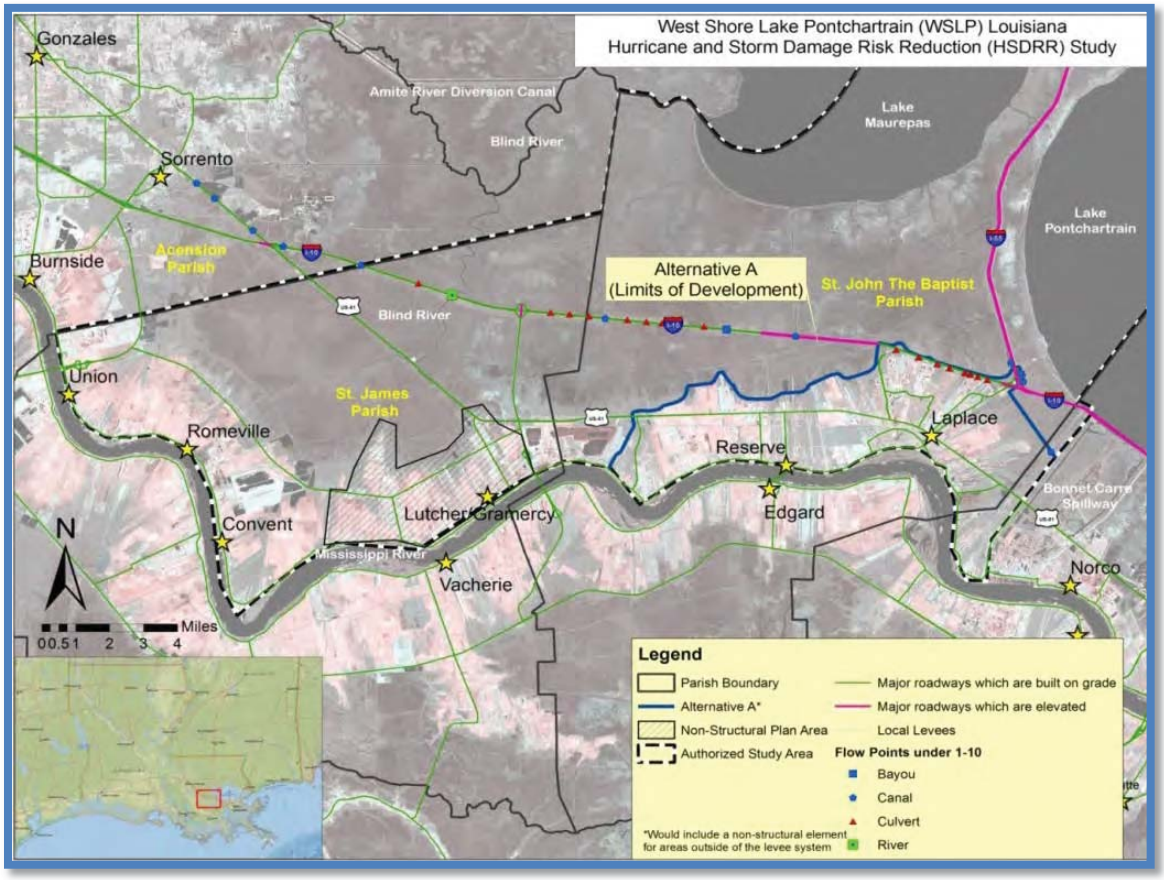


Figure 3-5: Alignment and features of Alternative A.

Construction would require roughly 3,100,000 cubic yards of earthen borrow material; 3,700,000 yards of geotextile fabric; 30,000 cubic yards of aggregate limestone road; nearly 5,000 linear feet of T-walls to cross under the interstate, or as frontal risk reduction for pump stations; 1,200 linear feet of flood gates; 240 linear feet of drainage gates; and 2 railroad gates. Eight pump stations on the alignment would require 25,000 cubic yards of concrete, 230,000 square feet of sheet pile, nearly 7,000 tons of riprap, and 151,000 linear feet of concrete piles. Multiple culverts with flap gates would be constructed. Because the alternative hugs the wetland/non-wetland interface, Alternative A has the least adverse wetland impacts. However, the plan has the greatest residual risk (the risks left after all construction and safety measures have been assessed) because overtopping of the levee by surge would cause immediate inundation of populated areas. It also has the most pump stations which results in more maintenance and greater risk of system failure. It is the least adaptable because expansion of the levee would require the purchase and/or relocation of existing structures. The plan does not reduce risk to infrastructure in St. James Parish.

Alternative C: Bonnet Carré Spillway to the Hope Canal to Mississippi River

Alternative C Figure 3-6 evaluates the feasibility of avoiding multiple pipeline and utility crossings. It follows the Alternative A alignment between the West Guide levee of the Bonnet Carré Spillway to the US-51 interchange, where it then tracks north across US-51 and along a pipeline transmission corridor. The approximately 18.27-mile alignment crosses I-10 and follows the pipeline corridor through wetlands near the Belle Terre exit until it reaches Hope Canal. The alignment then turns south and extends to the MRL. Elevation and/or acquisition of structures outside the alignment would reduce risk of storm surge-related damage to structures in areas west of the Hope Canal.

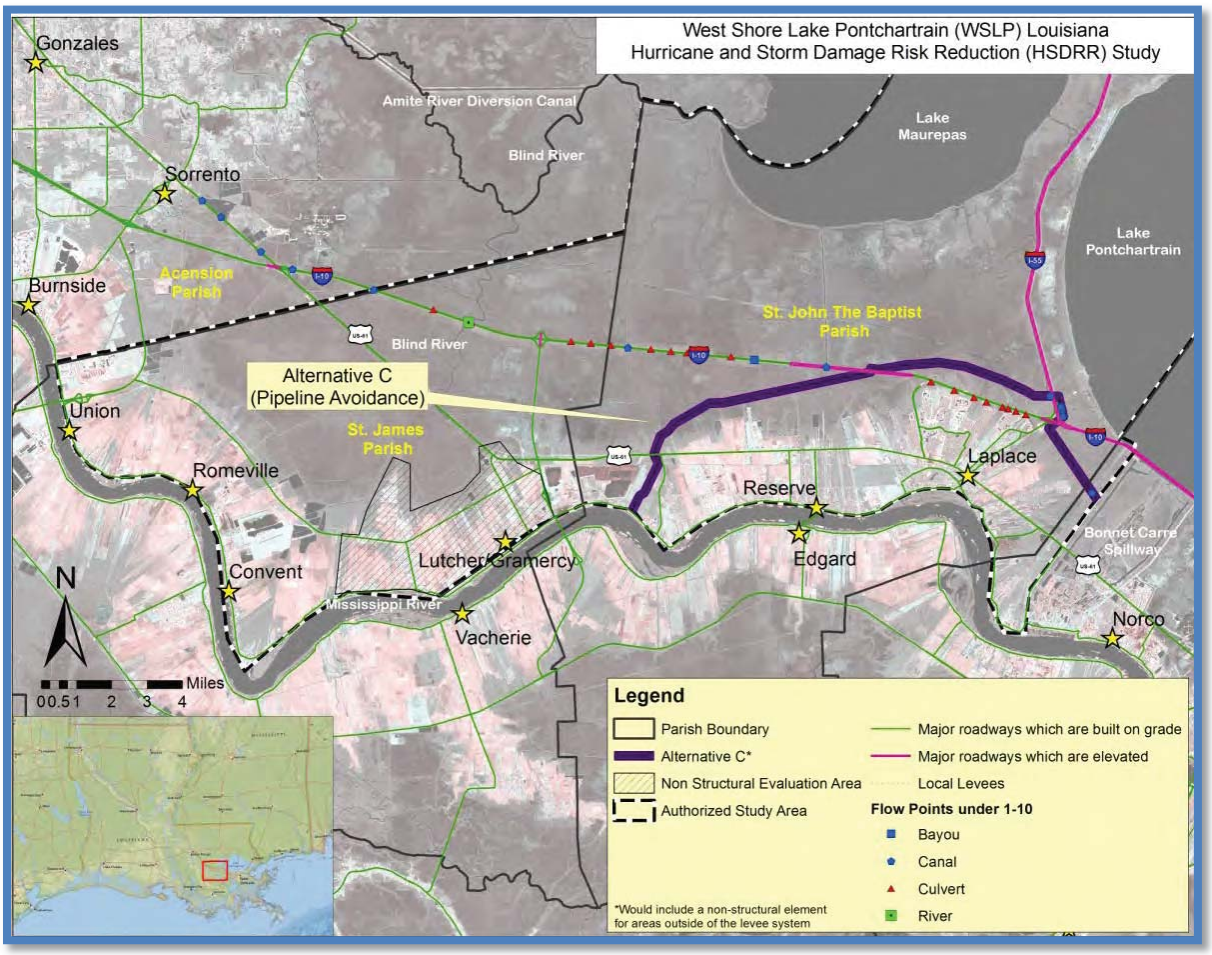


Figure 3-6: Alignment and features of Alternative C.

Construction of the alternative would require roughly the same amount of borrow material as Alternative A. It would require 3,365,000 cubic yards of geotextile fabric; nearly 26,000 cubic yards aggregate limestone road; 5,300 linear feet of T-walls; 300 linear feet of flood gates; 200 linear feet of drainage gates; 4 pump stations; and 2 railroad gates. Environmental structures similar to those identified for Alternative A would be built. This alternative encloses more wetlands than Alternative A, and would require more environmental structures, but has less residual risk because levee overtopping would not immediately inundate populated areas. It is more adaptable should changing conditions require modifications to the structures because the alignment does not abut existing structures. However, the plan does not reduce risk to infrastructure in St. James Parish.

Alternative D: Bonnet Carré Spillway to Ascension Parish

Alternative D Figure 3-7) is a westward extension of the Alternative C alignment along the I-10 corridor into Ascension Parish. It continues west at the St. James Parish line slightly north of I-10 until it reaches the Old New River, where it proceeds north to the non-Federal Laurel Ridge levee in Ascension Parish. Measures to maintain water flow and to reduce impacts to enclosed wetlands would be built. Alternative D reduces risk to communities in St. Charles, St. John and St. James Parishes and provides a level of risk reduction to a segment of the I-10 hurricane evacuation route.

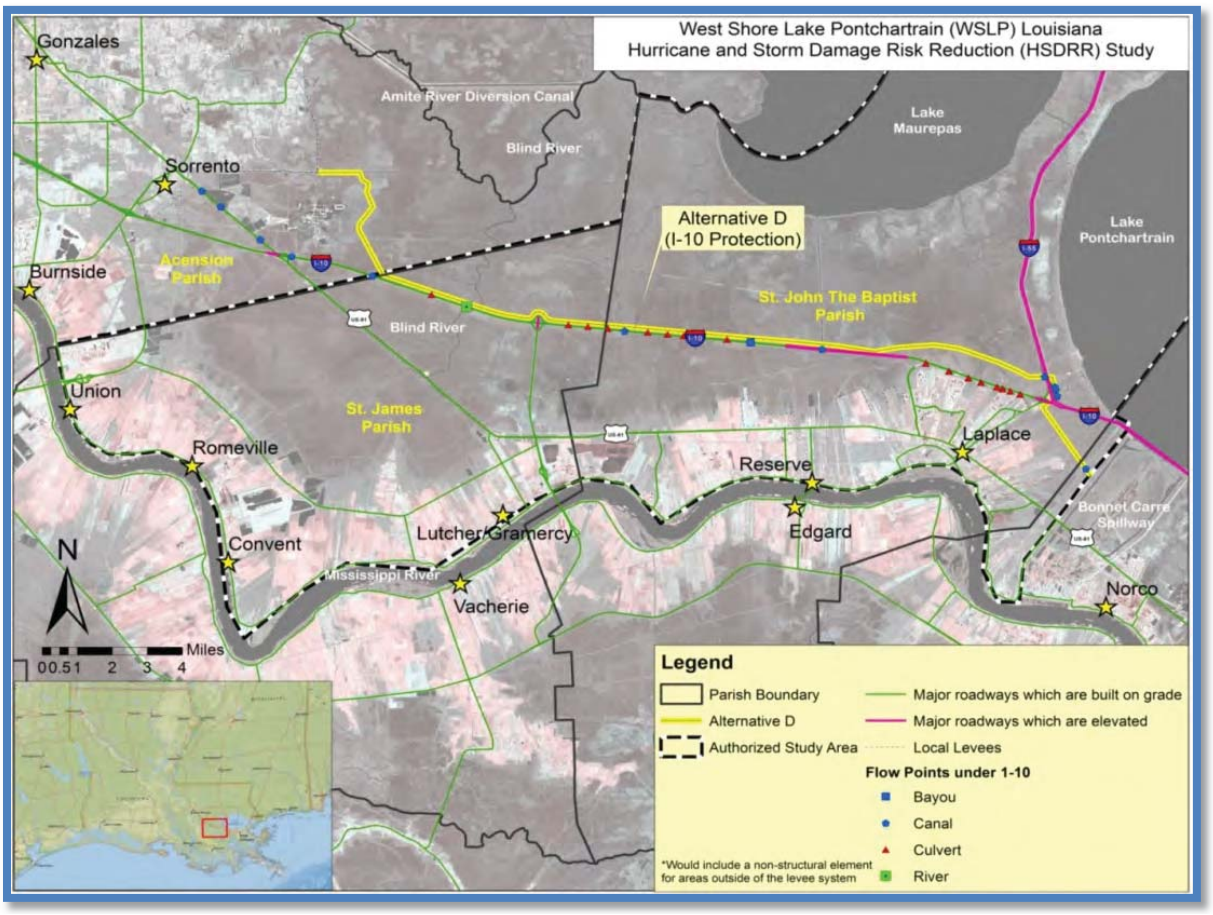


Figure 3-7: Alignment and features of Alternative D.

Construction of the approximately 28-mile alternative would require 3,700,000 cubic yards of borrow material, 3,037,000 square yards of geotextile fabric; approximately 37,000 cubic yards of aggregate limestone road; just over 4,000 linear feet of T-walls; 300 feet of flood gates; 400 feet of drainage gates; approximately 6 pump stations; nearly 24,000 cubic yards of concrete; almost 200,000 square feet of sheet pile; approximately 5,900 tons of rip rap; 154,000 linear feet of concrete piles; and environmental structures, most notably at Blind River, a Louisiana Scenic River. It encloses the most acres of wetlands requiring more environmental structures than any of the other alternatives. Each of these structures would require maintenance because failure of the environmental structures could increase adverse environmental impacts. The greater number of structures results in more maintenance and a greater risk of failure. There is concern about potential impounding of large areas of wetlands under this alternative, especially if the river diversion projects are constructed. Alternative D provides the greatest structural risk reduction and would reduce risks to roads and other infrastructure in St. James Parish.

3.6 Cost Estimates

Estimated costs for levees, floodwalls, and pump stations; real estate costs; operation and maintenance, repair, rehabilitation and replacement (OMRR&R); environmental mitigation; and non-structural features were totaled for each alternative and compared to each other to help identify a TSP. Costs for the non-structural features of Alternative A and Alternative C, and costs associated with mitigation for indirect impacts are uncertain. For this reason, a range of costs was developed for each feature.

Non-structural Cost: Non-structural costs were based on a 100% structure survey of area improvements. The cost of raising and/or acquiring structures located in the 2020 and 2070 100-year floodplains was evaluated by comparing the cost of elevating the structure to the cost of acquiring the structure. The lesser cost was used to determine the cost of the non-structural feature. RSLR greatly impacts the number of structures to be raised, resulting in uncertainty as to how many structures would have to be raised by any given date. A minimum cost of the non-structural feature of $53,143,789 was developed based on the cost of reducing risk to structures in the 2020 100-year floodplain. A maximum cost of $305,256,794 was developed based on the cost of reducing risk to structures in the 2070 100-year floodplain. The maximum cost was used for comparison.

Indirect Impact Cost: At this stage, mitigation costs for indirect impacts remain uncertain due to limited hydrologic information and lack of a full wetland value assessment WVA . To reduce the uncertainty of costs associated with mitigating for indirect impacts, a maximum cost based on Morganza to the Gulf and Lake Pontchartrain and Vicinity project estimates, and a minimum cost based on local mitigation bank costs were developed. These costs were averaged. In place of WVA analysis, habitat reduction values from 5 - 75 percent were calculated. Using these values, the average estimated mitigation cost associated with indirect impacts ranged from $871,000,000 to $980,000,000 for Alternative A, $844,000,000 to $1,000,000,000 for Alternative C, and $672,000,000 to $2,200,000,000 for Alternative D.

Based on available information, the habitat reduction value impacts are estimated to be approximately 15 percent of the total enclosed wetlands, as shown in Table 3-3. The risk reduction features will be designed to maintain existing hydrologic flows to the extent practicable. If this can be achieved, indirect impacts would be limited to those that occur during closure of structures for storm surge events – an estimated 8.5 days per year. A WVA analysis based on hydrologic modeling will be conducted on the TSP during feasibility design.

Table 3-3: Estimated first costs for final array of alternative plans.

	Alternative A	Alternative C	Alternative D
Levees & Floodwalls	$335,898,670	$334,156,997	$339,508,346
Pump Stations	$132,162,500	$112,687,500	$166,437,500
Pipeline Relocations	$70,300,000	$35,100,000	$11,693,750
Real Estate	$3,849,000	$3,283,000	$2,434,000
Direct Habitat Impacts	$17,000,791	$35,710,811	$43,323,364
Indirect Mitigation Cost (15%)	$23,123,679	$54,655,968	$327,687,626
Non-Structural 2070*	$305,256,794	$305,256,794	$0
Total Cost	**$887,591,434**	**$880,851,070**	**$891,084,586**

***Some non-structural costs will be LERRD costs that are the responsibility of the NFS. The non-structural costs will be spread over the entire period of analysis and will be heavily discounted and result in less than 17% of the total average annual costs.**

OMRR&R Cost: Table 3-4 provides preliminary OMRR&R cost estimates for each alternative. Annual costs will be refined during feasibility level design and analysis. Upon notice of

completion of construction of the project, or a functional portion of the project, the CPRAB shall commence OMRR&R responsibilities for the project Chapter 8 .

Table 3-4: Comparison of annual OMRR&R cost for final array of alternative plans.

Alternative A	390	$234,000	$7,277,050	$7,511,050
Alternative C	868	$520,800	$3,607,275	$4,128,075
Alternative D	1269	$761,400	$5,421,538	$6,182,938

NOTE: Based on levee right-of-way acreage, 2012 dollars, and includes a 25% contingency. OMRR&R costs for mitigation are not included. Cost include grass cutting; pump station and flood gate replacement; and other planned OMRR&R activities.

3.7 Summary of Accounts and Comparison of Alternatives

Plans in the final array are assumed to provide equal levels of risk reduction. To facilitate evaluation and comparison of the alternatives, four Federal Accounts were used to assess the effects of alternatives. The accounts are National Economic Development NED), Environmental Quality EQ), Other Social Effects (OSE), and Regional Economic Development RED).

No Action Alternative: No NED benefits would be associated with the No Action Alternative. There would continue to be adverse impacts to the EQ as salinity levels increase in the area, affecting wetlands and eventually causing impacts to residents OSE) in the immediate vicinity of the study by reducing the natural swamp buffer. Reducing the natural buffer could also cause uncertainty to RED by impacting major oil refineries in the region and the overall economy.

Alternative A: Alternative A provides NED benefits, but provides less net benefits than Alternative C. It encloses the fewest acres of wetlands, resulting in the least adverse impacts to EQ. However, it risks immediate inundation of developed areas in an overtopping event; thus reducing safety to residents OSE in the area. It limits future modification or reinforcement of the system due to its proximity to existing structures. It would also risk disruptions to the local drainage patterns northward if design parameters are exceeded. Figure 3-8 . While Alternatives C and D would disrupt existing drainage if design parameters are exceeded, the damage resulting would be greatest for Alternative A due to

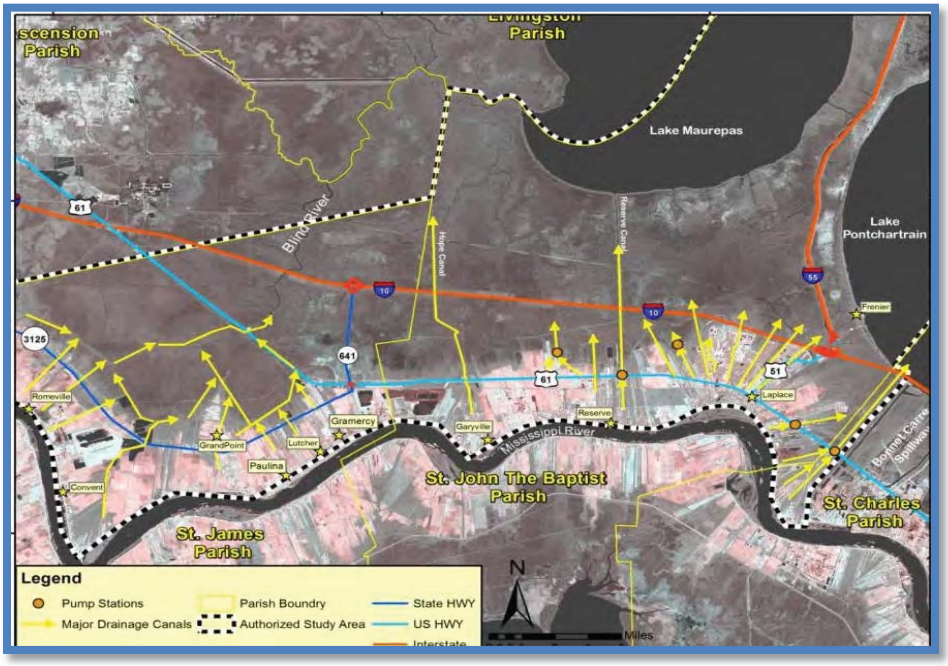


Figure 3-8: Study area drainage patterns.

the close proximity of the levee to existing structures. There is no risk reduction to roads in St. James Parish which could flood, preventing employees from accessing vital industries.

Alternative C: Alternative C maximizes benefits. It has more adverse impacts on EQ than Alternative A but reduces impacts to wetlands compared to Alternative D. In case of a major storm surge event that exceeds the federally authorized project design, Alternative C could reduce the risk to OSE because storm surge would, over time, first fill in the wetlands before potentially inundating developed areas. Because this alternative addresses an uncertain yet reasonably foreseeable need to modify the system, it could provide stability to RED in developed areas. The alignment can be enlarged should RSLR be greater than anticipated without displacing area residents. There is no risk reduction to roads in St. James Parish.

Alternative D: Alternative D provides NED benefits, but does not maximize those benefits. It provides risk reduction to a larger area thus reducing risk to more area residents. Structural risk reduction is provided to roads in St. James Parish, reducing the risk that employees would be unable to access critical infrastructure and places of employment. Additionally, because the levee is not located in close proximity to existing structures, the threat of flooding due to exceedence of design parameters is lessened. Alternative D poses potential uncertainties concerning the impoundment of large areas of wetlands, especially if the river diversion projects are constructed. While it would prevent saltwater intrusion, it would risk impacting hydrology by enclosing approximately 54,800 acres of swamp and would impact the EQ of the Maurepas WMA as well as Blind River, a Louisiana Scenic River. Per the Wild and Scenic River Act, construction within 100 feet of a scenic stream requires a permit.

Economic Costs Comparison: The parametric implementation costs were annualized using the current interest rate 3.75%) and a 50 year period of analysis 2020-2070) as shown in Table 3-5. In 2020, only 5% of the benefits are derived from St. James Parish and only 219 structures are located within the 100-year floodplain. The cost of the non-structural feature for Alternatives A and C increases from approximately $53,000,000 in year 1 to over $305,000,000 in year 50) due to RSLR. Most of the structures would not reside in the 100-year floodplain until the later years of the period of analysis. Because of this, the non-structural costs were spread evenly over a 53-year period beginning in 2017 and ending in 2069; and then compounded or discounted to the 2020 base year. The annual benefits were compared to the cost assuming a 100-year level of risk reduction. The total annual benefits were then compared to the total annual costs.

Table 3-5: Economic comparison of final array of alternative plans.

Alternative	Implementation Costs ($ millions)	Annual OMRR&R ($ millions)	Equivalent Annual Benefits ($ millions)	Annual Costs ($ millions)	Benefit-to-Cost Ratio	Annualized Net Benefits ($ millions)
A	887.6	7.5	59.9	40.5	1.48	19.4
C	881.0	4.1	59.9	36.8	1.63	23.0
D	891.1	6.2	59.9	46.7	1.28	13.2

Alternative C has the lowest cost and the highest net benefits followed by Alternative A and Alternative D. The preliminary benefit to cost ratio BCR) for Alternative C is equal to 1.63 to 1 with annualized net benefits of approximately $23,000,000. For Alternative A the BCR is 1.48 and for Alternative D it is 1.28 with net benefits of $19,400,000 and $13,200,000, respectively.

Hydrologic information is limited, so estimates were not developed to evaluate the number of environmental structures that would be required for the alternatives. The inclusion of environmental structures could greatly increase the cost of Alternative D, which encloses 79 square miles of wetlands, in comparison to Alternative A 5 square miles) and Alternative C 15 square miles). Benefits such as reductions in emergency costs and damage to roadways have not been calculated and would expect to be greatest for Alternative D and the least for Alternative A. These benefits are usually minimal and would not impact the selection of the TSP.

Alternative A tracks the wetland-non-wetland interface in Laplace to its termination at the Hope Canal in western St. John the Baptist Parish. It requires the largest number of pump stations 8 pump stations) compared to Alternative C 4 pump stations) and would require approximately $7,500,000 in OMRR&R cost to maintain the fully constructed alternative compared to $4,100,000 in OMRR&R for Alternative C. If overtopped, Alternative A would allow immediate inundation at developed areas and I-10, resulting in the greatest residual risk.

3.8 Identifying the Tentatively Selected Plan

Alternative C is the tentatively selected plan TSP) and the NED plan as determined by the evaluation criteria. It fulfills the planning objectives stated in Section 1.5. It reasonably maximizes net benefits, consistent with protecting the Nation's environment in accordance with national environmental statutes, applicable Executive Orders, and other Federal planning requirements.

4.0 ENVIRONMENTAL CONSEQUENCES (*NEPA Required)

This chapter describes the direct, indirect and cumulative environmental consequences of implementing the proposed hurricane and storm damage risk reduction plans considered in this study. Topics in this chapter mirror the topics in Chapter 2. The potential impacts (effects of the alternatives in the Final Alternative Array to significant resources are compared to the No Action Alternative i.e., future without-project conditions .

4.1 Water Environment

4.1.1 Flow and Water Levels

Alternative C

Direct and Indirect Impacts: Structural measures would provide storm damage risk reduction for those areas with the greatest human development, including: Laplace and the immediately surrounding area of St. John the Baptist Parish; and the town of Montz, in St. Charles Parish. This alternative would reduce the risk of flow and water levels in the interior of the protected levee and pump system during a storm surge. During such an event the levee system would be closed thereby causing interior protected side) water stages and flows to decrease, while being similar for rainfall events. For the exterior unprotected side), water stages during storm events along the east bank of St. James Parish and east bank of Ascension Parish could, to some unknown extent, potentially increase when the levee system is closed. Furthermore, the length of storm surge inundation to the exterior wetlands adjoining the proposed structurally protected areas could be less than under the No Action Alternative, as there could be less storm surge to drain from the interior with the proposed levee and associated features in place. Additional modeling will be conducted during the feasibility phase to determine if any such potential exists.

Of the 14,486 existing residential structures located in St. James Parish, an estimated 1,571 residential structures could be potentially elevated. However, there would likely be no effects to flows or water levels attributable to this measure in the St. James Parish area. The buy-out non-structural measure would also not significantly impact flows or water levels in the St. James Parish area. Although the green space created from structures removed following buy-outs, may have some minor effects to water flows.

Major indirect impacts of the structural measures would be a decrease in tidal interchange between the interior protected side) and exterior unprotected side) areas of the proposed levee alignment. Proposed modifications to the interior drainage system, required to mitigate for project-induced interior storm damage, would operate by gravity drainage, with pumps operating only during storm events resulting in high exterior water levels. It was estimated the pumps would be operated, on average, for 1.7 storm events per year which equates to closure of gate structures on average 8.5 days per year. Consequently, hydrologic connectivity would be generally maintained between the wetlands within the 47 square mile levee-enclosed area and the surrounding swamps and Lakes Maurepas and Pontchartrain except during the closing of the system for storm events. Preliminary hydrologic modeling that does not include rainfall indicates that future without-project daily water stages on the protected side would be similar to future with-project conditions except during storm events as described above.

Figure 4-1 displays the with and without project water elevations for both the exterior and interior sides of the levee system. Flows into and out of the system not including rainfall) would also be similar to future without-project conditions, but there could be a brief time lag under the future with-project conditions. Figure 4-2 displays modeling simulation flows during the month of May for Area 5 near the Bonnet Carré. For this area, there was roughly ¾ the amount of interchange for with-project versus without-project. In addition, on average, there was a 10-minute delay in the timing of the tidal flows. Should the trend of increased precipitation and

climate warming continue, there could be continued increases in runoff associated with increased rainfall events which may affect the total volume of freshwater in the area as well as during storm damage peaks USACE 2004). Non-structural measures would have little, if any, significant indirect impacts on flows or water levels.

Figure 4-1: Model results of with and without proposed levee alignment affects on tidal circulation.

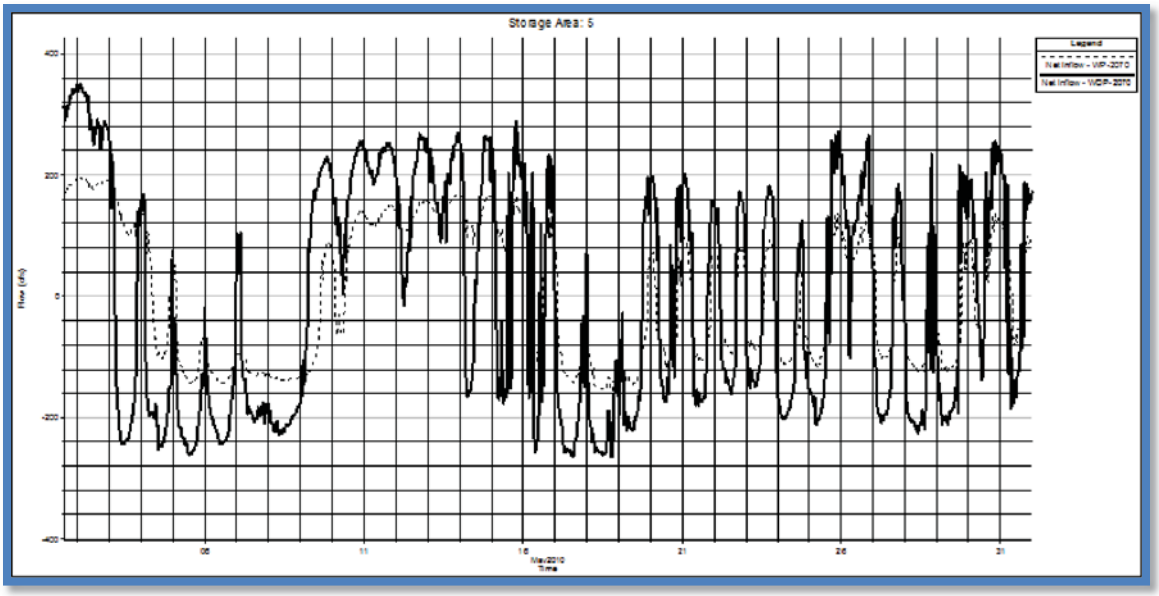


Figure 4-2: Modeling simulation flows during month of May for Area 5 (near Bonnet Carré guide levee).

Alternative C has the potential to increase stages to the areas exterior to the levee. These areas include the east bank of St. James Parish and the Gonzales and French Settlement areas in

Ascension Parish. Concern over induced flooding due to the Greater New Orleans Hurricane and Storm Damage Risk Reduction System HSDRRS) caused similar concern after Hurricane Isaac to the Laplace area. However, based on ADCIRC studies after Hurricane Isaac induced flooding in Ascension Parish is not anticipated.

Cumulative Impacts: Impacts would be the incremental direct 856 acres) and indirect effects up to 8,424 acres) on flows and water levels attributable to the proposed action in addition to the direct and indirect impacts to flow and water levels attributable of other previous, existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Impacts in the Pontchartrain Basin levee systems, consistent with the USACE November 2012 preliminary report titled "Hurricane Isaac With and Without 100-year HSDRRS Evaluation" and the "Comprehensive Environmental Document, Phase I, Greater New Orleans HSDRRS", USACE 2013) include: approximately 217 miles of levees systems within the existing New Orleans HSDRRS; approximately 1,115 acres of recently constructed portions of the West Bank and Vicinity HSDRRS system; additionally the 142-mile long MR&T levee system and the 18-mile long non-Federal levee from Caernarvon to White Ditch; as well as potential impacts of projects approved for construction. The State levee systems include approximately 3,122 miles of levee. Approximately 100,000 miles of levees exist throughout the Nation ASCE 2013).

Alternative A

Direct, Indirect and Cumulative Impacts: Impacts for structural measures would be similar to Alternative C, except they would occur over a smaller area 38 square miles enclosed area). Moreover, Alternative A has the potential to increase flood stages in the immediate areas exterior to the levee. However the affected area would be of a smaller footprint than the influence area of Alternative C. Direct, indirect and cumulative impacts of non-structural measures would be similar to those identified for Alternative C.

Alternative D

Direct Impacts: Impacts would be similar to Alternative C except over a much larger area 160 square miles) including the areas with the greatest human development within St. Charles and St. James and St. John the Baptist Parishes. The western-most portion of the Alternative D levee alignment would extend outside of the authorized project area into Ascension Parish to tie into an existing non-Federal levee. This alternative would directly impact flow and water levels in the interior protected side) and exterior during rainfall and hurricane events. Interior water stages and flows would likely decrease for hurricane events, while being similar for rainfall events assuming that the drainage structures or pumps are operating).

Indirect and Cumulative Impacts: Impacts would be similar to Alternative C, except over a larger area 160 square mile enclosed area) and the following exception: Alternative D would also have the potential to increase stages to the areas exterior to the proposed levee alignment. The probable affected area would be much larger than the influence area of Alternative C.

4.1.2 Sedimentation and Erosion

Alternative C

Direct and Indirect Impacts: Implementing the proposed action would require approximately 3,100,000 cubic yards of borrow sediments. However, best management practices would be used to avoid, minimize and reduce potential sedimentation and erosion impacts during borrow excavation. Construction of levees earthwork fill, placement of geotextile, T-walls, storm damage gates, drainage gates, sheetpile, riprap, gates and pumping stations would also utilize best construction management practices to avoid, minimize and reduce potential erosion and

sedimentation into adjacent wetlands. These impacts would generally be minor and short-term, lasting only during construction of the proposed project features. Indirect impacts would include significant reduction of erosion and sedimentation associated with storm events.

The placement of structures within waterways intersecting the levee alignment has the potential to create a sedimentation/erosion maintenance issue directly upstream and downstream of the structure. However, these structures would be designed and scour protection would be placed to minimize sedimentation/erosion issues. Several pumping stations would also be placed along the waterways that would intersect the levee alignment. These pump stations have the potential to cause severe erosion in the vicinity of the suction and discharge areas. The pump stations would be designed and scour protection would be placed to minimize sedimentation/erosion issues. Even as such, these issues may still exist. The proposed action has the potential to decrease tidal interchange velocities throughout the area resulting in increased sedimentation within waterways of both the interior and exterior of the proposed levee alignment.

Cumulative Impacts: Consist of the incremental direct and indirect impacts of implementing and operating the proposed hurricane and storm damage risk reduction system in addition to the direct and indirect impacts to sediment and erosion attributable to other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A
Direct, Indirect and Cumulative Impacts: Impacts would be similar to Alternative C except over a smaller area.

Alternative D
Direct, Indirect and Cumulative Impacts: Impacts would be similar to Alternative C except over a larger area.

4.1.3 Water Quality and Salinity

Alternative C
Direct and Indirect Impacts: Some wetland and open water areas would be converted into upland habitat for construction of hurricane protection features and would no longer provide water quality benefits. Because fill and construction materials are anticipated to be free of contaminants, discharge of these materials into existing adjacent waters is not expected to result in adverse effects to aquatic organisms. Construction impacts to runoff would be minimized through implementation of a Stormwater Pollution Prevention Plan SWPPP USEPA 2012). Indirect impacts include water exchange between the flood and protected side of the levee system. This could lead to localized areas of stagnation and reduced salinity on the protected side of the levee and local areas of increased salinity on the flood side of the levee system. Additional development in areas behind the levee alignment could lead to additional point and nonpoint discharges within these areas. Structures operation is expected to impact biogeochemical cycling for wetlands within the proposed alignment. The project would provide for the protection of protected side wetlands, potentially extending their lifespan and their water quality functions. However, wetlands outside of the project are expected to experience an increase in wave energy and salinity, particularly during storm surge.

Cumulative Impacts: The proposed project, combined with other projects in the area, and activities could cumulatively impact water quality. Additionally, the combination of the proposed project and the several diversion projects could complicate water quality and hydrology, particularly for the protected side of the proposed alignment, leading to changes in wetlands biogeochemistry and water quality function. Cumulative impacts would be the incremental direct

and indirect impacts of implementing and operating the proposed hurricane storm damage risk reduction system described above plus the direct and indirect impacts attributable to other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A
Direct, Indirect and Cumulative Impacts: The alignment of this alternative would minimize further impoundment of wetlands 3,564 acres as compared to 8,424 acres for Alternative C ; hence, water quality impacts would be expected to be similar in nature, but less than, impacts associated with Alternative C.

Alternative D
Direct, Indirect and Cumulative Impacts: This alternative encloses the largest area by a significant margin 56,228 acres) while also having the greatest amount of new levee construction, water quality impacts associated with this alternative would be expected to be similar in nature but greater than impacts associated with Alternative C.

4.2 HUMAN ENVIRONMENT

4.2.1 Population and Housing

Alternative C
Direct and Indirect Impacts: Structural measures would have no direct impacts to population and housing. However, the non-structural measure of elevating residential structures would cause residents temporary and minor inconveniences related to relocating to a temporary residence and then returning to their elevated residence. Approximately 1,400 residences could be elevated in the Gramercy-Lutcher area. Non-structural acquisition of residential structures buy out could lead to a permanent loss of population and housing in the Gramercy/Lutcher area, if residents relocate outside the area. Indirect impacts for both the structural and non-structural features include reduced risk of hurricane storm surge damage to populations and housing. This would potentially enhance the stability and sustainability of population and housing resources behind the levee alignment. Elevating residential structures would affect access to elevated residences. Non-structural acquisition could lead to changes in population demographics, localized or on a larger scale. Non-structural acquisition could also lead to neighborhood housing interspersed with small to large areas of green space throughout the localized area. It is anticipated that local parish building codes would place restrictions on the elevation of future construction in the area where non-structural acquisition or raising in place is necessary. Implementation of the non-structural measure will be further developed and assessed during detailed feasibility-level design and provided in the final report.

Cumulative Impacts: Impacts would be the incremental direct and indirect impacts of implementing and operating the structural and non-structural measures of Alternative C on population and housing plus the direct and indirect impacts to by other previous, existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A
Direct, Indirect and Cumulative Impacts: Impacts would be the same as Alternative C.

Alternative D
Direct, Indirect and Cumulative Impacts: Impacts would be the same as Alternative C, except non-structural measures would not be included.

4.2.2 Employment, Business and Industrial Activity (including Agriculture)

Alternative C

Direct and Indirect Impacts: Proposed structural measures would cause the Cajun Pride Swamp Tours temporary loss of access to the adjacent waterway until construction of boat access to the waterway is restored following construction of this reach of the project. The non-structural measures of raising non-residential structures could temporarily interrupt business operations as they are relocated to temporary locations. The acquisition of non-residential structures could lead to a permanent loss of employment and business activity in the Gramercy/Lutcher area where a total of 46 non-residential structures are being considered for elevation and 90 non-residential structures are being considered for acquisition by government. Indirect impacts for both the structural and non-structural features include reduced risk of damages from hurricane storm surge. It is anticipated that local parish building codes would place restrictions on the elevation of future construction in the area where non-structural acquisition or raising in place is necessary. If a business is elevated then access to the elevated facility could be more difficult and business operations could be more difficult to conduct. If a business is acquired there could be loss of jobs and a portion of the local tax base in the area. In contrast to the potential adverse effects to the St. James Parish area described above, the St. Charles and St. John the Baptist Parishes areas would generally benefit from implementation of the hurricane and storm surge damage risk reduction measures which would allow these businesses, industries and agricultural operations to continue to operate during storm events. Implementation of the non-structural measure will be further developed and assessed during detailed feasibility-level design and provided in the final report.

Cumulative Impacts: Impacts would be the incremental direct and indirect impacts of implementing the proposed action plus the direct and indirect impacts by other previous, existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A

Direct, Indirect and Cumulative Impacts: Impacts would be the same as Alternative C.

Alternative D

Direct, Indirect and Cumulative Impacts: Impacts would be the same as Alternative C except all three parishes would be behind the levee alignment allowing for continued operation of businesses, industries and agriculture in St. James Parish during a storm surge event.

4.2.3 Public Facilities and Services

Alternative C

Direct and Indirect Impacts: Structural measures would not directly impact public facilities or services. However, non-structural measures of elevating public facilities would temporarily interrupt these services and inconvenience users until the facility is raised. Acquisition of public facilities could lead to relocation and/or a localized loss of public services in the Gramercy/Lutcher area. Indirect impacts for both the structural and non-structural features would include reduced risk of damage from hurricane storm surge for public facilities and services. In the event that a public facility is elevated, design will be such that the facility will be compliant with the requirements of the Americans With Disabilities Act. If it is necessary to acquire a public facility, it is likely that the facility will be substituted; however, it is likely that there could be temporary disruption of services. Implementation of the non-structural measure will be further developed and assessed during detailed feasibility-level design and provided in the final report.

Cumulative Impacts: Cumulative impacts would be the above described incremental direct and

indirect impacts on public facilities and services. It includes the direct and indirect impacts to public facilities and services by other previous, existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A
Direct, Indirect and Cumulative Impacts: Impacts would be the same as Alternative C.

Alternative D
Direct, Indirect and Cumulative Impacts: Impacts would be the same as Alternative C except for the absence of the indirect impacts associated with non-structural measures in the Gramercy/Lutcher area.

4.2.4 Transportation

Alternative C
Direct and Indirect Impacts: There would be no significant direct impacts. Rather, there would be minor temporary impacts in the form of increased vehicular congestion along roads, highways and streets during construction which cease following completion of construction activities. There would also be a degradation of the transportation infrastructure, primarily local roads and highways, as a result of the wear and tear from transporting construction materials. Indirect impacts would include a lower risk of storm damage-related damages to the transportation infrastructure for areas behind the proposed levee alignment.

Cumulative Impacts: Impacts would be the incremental direct and indirect impacts of implementing and operating Alternative C plus the direct and indirect impacts by other previous, existing and authorized levee systems within the Pontchartrain Basin, the State and the Nation.

Alternative A
Direct, Indirect and Cumulative Impacts: Impacts would be the same as Alternative C.

Alternative D
Direct and Indirect Impacts: Direct impacts would be similar to Alternative C, except construction impacts, such as traffic congestion and deterioration of the transportation infrastructure, could affect a total of 28 miles of roads. Indirect impacts would be similar to Alternative C, except risk reduction from storm damages transportation infrastructure would extend into the western portion of the area. This alternative could reduce the risk of inundation to a ground level section of I-10 in the western portion of the area which could improve access for emergency responders and prevent delays of local and regional residents returning to residences after storm events.

Cumulative Impacts: Impacts would be similar to Alternative C, except storm surge risk reduction to the transportation infrastructure would extend into the western portion of the project area. These would be in addition to the direct and indirect impacts of other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

4.2.5 Community and Regional Growth

Alternative C
Direct and Indirect Impacts: There would be no direct impacts of the structural measures or with the non-structural measures of elevating structures. In contrast, acquisition of residential and non-residential structures could lead to a permanent loss of population and business activity in the Gramercy/Lutcher area thereby negatively affecting the community and regional growth in this area. There are 1571 residential and 90 non-residential structures considered for elevating and/or acquisition by the government which may impact community and regional growth.

Indirect impacts for both the structural and non-structural features of the alternative include reduced hurricane storm damage risk reduction for communities thereby contributing to potential growth opportunities for communities in the three-parish area. The proposed action could enable community growth to occur as the lower incidence of storm sure damage allows communities to focus more on community-building activities rather than preparing for and recovering from storm surge events. Implementation of the non-structural measure will be further developed and assessed during detailed feasibility-level design and provided in the final report.

Cumulative Impacts: Impacts would be the incremental direct and indirect impacts of implementing Alternative C on community and regional growth in addition to the direct and indirect impacts of other existing and authorized levees in the Pontchartrain Basin, the State and the Nation.

Alternative A
Direct, Indirect and Cumulative Impacts: Impacts would be the same as Alternative C.

Alternative D
Direct and Indirect Impacts: Direct impacts would include structural hurricane and storm surge damage risk reduction affecting community and regional growth for not only the St. Charles and St. John the Baptist Parishes, but also St. James Parish. Indirect impacts would be similar to Alternative C except over a three-parish area.

Cumulative Impacts: Impacts would be similar to Alternative C, except nonstructural measures would not be necessary in the Gramercy/Lutcher area. These incremental impacts would be in addition to the direct and indirect impacts to community and regional growth of other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

4.2.6 Tax Revenues and Property Values

Alternative C
Direct and Indirect Impacts: Property values near levee construction sites may decrease temporarily due to added traffic congestion and construction noise and dust. These impacts would be temporary and minor, lasting only during construction. It is unknown at this time if elevating structures would have any effects on property values. However, acquisition of properties could reduce tax revenues and property values. Currently, there are 1400 residential and 90 non-residential structures being considered for elevating and/or acquisition by the government. Implementation of the non-structural measure will be further developed and assessed during detailed feasibility-level design and provided in the final report. Implementation of the non-structural measure will be further developed and assessed during detailed feasibility-level design and provided in the final report.

Indirect impacts could include increases in tax revenues and property values due to the increased hurricane storm damage risk reduction for residential properties and businesses. Indirect impacts of non-structural measure of acquisition could result in a decrease in tax revenue and property values because they would be converted to green space.

Cumulative Impacts: Impacts would be the above described incremental direct and indirect impacts of implementing and operating Alternative C in addition to the direct and indirect impacts to tax revenues and property values by other previous, existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A
Direct Impacts: Impacts would be the same as Alternative C. Construction would be closer to development than Alternative C, thereby creating a greater chance of temporarily decreasing property values due to added traffic congestion, noise and dust during the construction.

Indirect and Cumulative Impacts: Impacts would be the same as Alternative C.

Alternative D
Direct Impacts: Direct impacts would include structural hurricane and storm surge damage risk reduction affecting tax revenues and property values not only for the St. Charles and St. John the Baptist Parishes, but also St. James Parish. Indirect impacts would be similar to Alternative C except over a three-parish area.

Indirect and Cumulative Impacts: Impacts would be the same as Alternative C.

4.2.7 Community Cohesion

Alternative C
Direct and Indirect Impacts: There would be no direct impacts from the structural measures. However, if residential structures are elevated then the residents would be temporarily relocated and community cohesion would be disrupted during the time the structures are being elevated. The acquisition of residential and non-residential structures could lead to a permanent loss of populations and business activities in the Gramercy/Lutcher area. This would have a negative impact on community cohesion in the area. Currently, there are 90 non-residential structures being considered for acquisition by government. Indirect impacts for both the structural and non-structural features include reduced storm damage risk for communities from the hurricane and storm surge damages, thus preserving the spatial patterns of social interaction and maintaining community cohesion. Non-structural measures may affect community cohesion in some localized areas in the St. James Parish area, especially with regard to acquisition. Implementation of the non-structural measure will be further developed and assessed during detailed feasibility-level design and provided in the final report.

Cumulative Impacts: Impacts would be the above described incremental direct and indirect impacts of implementing and operating Alternative C in addition to the direct and indirect impacts to community cohesion by other previous, existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A
Direct, Indirect and Cumulative Impacts: Impacts would be the same as Alternative C.

Alternative D
Direct and Indirect Impacts: Direct impacts would include structural hurricane and storm surge damage risk reduction for the St. Charles, St. John the Baptist and St. James Parishes. Direct and indirect impacts associated with non-structural measures would not be present under this alternative.

Cumulative Impacts: Impacts would be similar to Alternative C, except nonstructural measures for the Gramercy/Lutcher area are not included in this alternative. These incremental impacts would be in addition to the direct and indirect impacts of other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

4.2.8 Environmental Justice

Alternative C

Direct and Indirect Impacts: Discussion on the plan formulation and economic feasibility of screening alternatives can be found in Appendix D and Appendix E. During screening and optimization it was determined that it would not be economically justified to extend Alternative C into St. James Parish or to create a ring levee to address limited damages. Incorporating non-structural measures into Alternative C allows for an equal level of storm surge risk reduction across the three-parish area. Those properties eligible for acquisition may have an impact on the economic base found within these communities by removing portions of the population that contribute to the local economy. This may contribute to changes not only in community cohesion but also a potential collapse of the entire local community.

Despite existing base floor elevations differing among individual structures, structure-raising would provide the same level of risk reduction benefits per structure at year 2070 end of the period of analysis). The costs of structure-raising would not be borne by any single individual or the community; rather, these costs would be part of the proposed project costs. Alternative C would provide additional safety to life, health and properties of residents and businesses within the study area by allowing storm water to first accumulate in a wetland area before potentially, in a worst case scenario, impacting structures. Drainage features and pumps included in this alternative would reduce this risk to residents.

Cumulative Impacts: Cumulative impacts would be the incremental direct and indirect impacts of implementing storm damage risk reduction measures on minority and low income populations in the area plus the direct and indirect impacts on minority and low income populations from hurricane storm damage risk management projects within the Pontchartrain Basin, the State and the Nation.

Alternative A

Direct, Indirect and Cumulative Impacts: Impacts would be the same as Alternative C.

Alternative D

Direct, Indirect and Cumulative Impacts: Alternative D extend structural measures for hurricane and storm damage risk reduction for all populations within the area removing the direct, indirect and cumulative impacts associated with the non-structural measures.

4.3 NATURAL ENVIRONMENT

4.3.1 Soils, Water bottoms and Prime and Unique Farmlands

Alternative C

Direct Impacts: A total of 856 acres, would be converted to levee, including 775 acres of primarily hydric soils of Cancienne and Fausse soils in St. Charles Parish; and Cancienne and Carville, Barbary, Schreiber and Gramercy soils in St. John the Baptist Parish (Table 4-1).

Approximately 14.8 acres of water bottoms in canals such as Reserve Flood Relief Canal and waterways such as the Mississippi Bayou would also be impacted. A total of approximately 55.4 acres of land classified as prime farmlands would be converted to nonagricultural use. Project impacts would be related to the construction of levee earthwork fill, geotextile, T-walls, storm damage gates, drainage gates, sheetpile, riprap, gates and pumping stations. The remaining project-induced impacts would be to existing developed areas such as highways and pipeline rights-of-way. The CEMVN has coordinated these potential impacts with the NRCS Appendix A) and determined that the proposed conversion would be consistent with the Farmland Protection Policy Act and the USACE's internal policies. It is anticipated that the

Bonnet Carré government furnished borrow site has enough borrow material for the entire proposed action. Raising structures would have no direct impacts on soils or water bottoms; whereas, the acquisition of structures would result in soils returned to "green space" i.e., structures, including slab foundations, would be removed from the area .

Table 4-1: Soil associations directly impacted by alternative alignments.

Soil Association	Alternative A	Alternative C	Alternative D
Cancienne and Carville soils CR)	0.22 acres	-	0.22 acres
Levees-borrow pits (LV)	3.1 acres	3.6 acres	3.6 acres
Cancienne silty clay loam Cn)	6.7 acres	18.7 acres	18.1 acres
Fausse clay FA)	6.6 acres	14 acres	14 acres
Cancienne and Carville soils CT)	143.8 acres	247.7 acres	239.6 acres
Barbary soils Ba)	49.3 acres	451.5 acres	894.1 acres
Carville silt loam CvA	3.0 acres	-	-
Schriever clay Sm	129.5 acres	62.6 acres	-
Gramercy silty clay GrA	16.7 acres	35.1 acres	-
Schriever clay, 0 to 1 percent slopes SkA	32.8 acres	16.3 acres	-
Cancienne silt loam CmA)	3.9 acres	10.7 acres	-
Cancienne silty clay loam CnA)	6.4 acres	-	-

Indirect Impacts: Up to approximately 8,424 acres of hydric soils could be affected due to enclosing the area within the levee and pump system. The levee and pump system would be a gravity drainage system with pumps operated only during hurricane/tropical storm surge events of approximately 1.7 storm events per year and would be closed for approximately 8.5 days per year. Consequently, hydrologic connectivity would be generally maintained with the surrounding swamps and Lakes Maurepas and Pontchartrain, except during the closing of the system for hurricane/tropical storm surge events. Preliminary hydrologic modeling (not including rainfall indicates that future with-project daily water stages on the protected side would be similar to future without-project conditions. In addition, future with-project flows into and out of the protected system not including rainfall) would also be similar to future without project conditions, but there could be a brief time lag of approximately ten minutes Section 4.1.1). The proposed action is not anticipated to convert any existing hydric or non-hydric soils, to a different soil type.

Cumulative Impacts: Cumulative impacts would be the incremental direct and indirect impacts of implementing Alternative C plus the direct and indirect impacts attributable to other previous, existing and authorized projects in the Pontchartrain Basin, the State and the Nation.

Alternative A

Direct and Indirect Impacts: Direct impacts would be similar to Alternative C with the following exceptions: a total footprint of 411 acres with direct impacts to approximately 376 acres of primarily hydric soils in St. John the Baptist Parish; impacts to Cancienne and Fausse soil associations in St. Charles Parish; and impacts of levee/structures construction to 7.8 acres of waterbottoms Table 4-1). Additionally, approximately 53.4 acres of land classified as prime farmlands would be converted to nonagricultural use. Indirect impacts would be similar to Alternative C except Alternative A could indirectly affect up to 3,564 acres.

Cumulative Impacts: Cumulative impacts would be similar to Alternative C with the following exceptions: there would be an incremental total of about 411 acres of direct impacts and up to 3,564 acres of indirect impacts on soil resources and water bottoms; about 53.4 acres of

farmlands converted to non-agricultural use; in addition to the direct and indirect impacts attributable to soils, water bottoms and prime and unique farmlands attributable to other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative D

Direct, Indirect and Cumulative Impacts: Direct impacts would be similar to Alternative C with the following exceptions: Alternative D, with a total footprint of 1,181 acres, would directly impact approximately 1,115 acres of primarily hydric soils of Cancienne and Fausse soils in St. Charles Parish; Cancienne and Carville, Barbary, Schriever and Gamercy soil associations in St. John the Baptist Parish; and Barbary soils in Ascension and St. James Parishes. Alternative D would also directly impact approximately 17.5 acres of water bottoms, including the Blind River and Mississippi Bayou. No prime or unique farmlands would be impacted. Indirect impacts would be similar to Alternative C except Alternative D could indirectly affect up to 56,228 acres. Cumulative impacts would be similar to Alternative C with the following exceptions: incremental direct impacts of approximately 1,115 acres of soil resources and 17.5 acres of water bottoms; and up to 56,228 acres of indirect impacts in addition to the direct and indirect impacts to soil resources, water bottoms and prime and unique farmlands attributable to other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

4.3.2 Vegetation Resources

Alternative C

Direct Impacts: Alternative C would directly impact a total of approximately 719 acres of wetlands including primarily forested wetlands/swamp along the reach of the alignment located north of US-61, and approximately 55 acres of dry and/or wet BLH located along the reach of the alignment located south of US-61 Table 4-2 and Figure 4-3 .

Table 4-2: Direct impacts resulting in loss of vegetation resources.

Alternative and Habitat Type	Direct Impacts
Alternative C -- forested wetlands/swamp	719.16 acres
Alternative C -- dry and/or wet BLH	55.97 acres
Subtotal Alternative C -- wetlands impacted	775.13 acres
Alternative C – non-wetlands	80.87 acres
TOTAL ALTERNATIVE C	856 acres
Alternative A -- forested wetlands/swamp	358.26 acres
Alternative A -- dry and/or wet BLH)	18.29 acres
Subtotal Alternative A -- wetlands impacted	376.55 acres
Alternative A -- non-wetlands	34.45 acres
TOTAL ALTERNATIVE A	411 acres
Alternative D -- forested wetlands/swamp	1,115.08 acres
Alternative D – non-wetlands	65.92 acres
TOTAL ALTERNATIVE D	1,181 acres

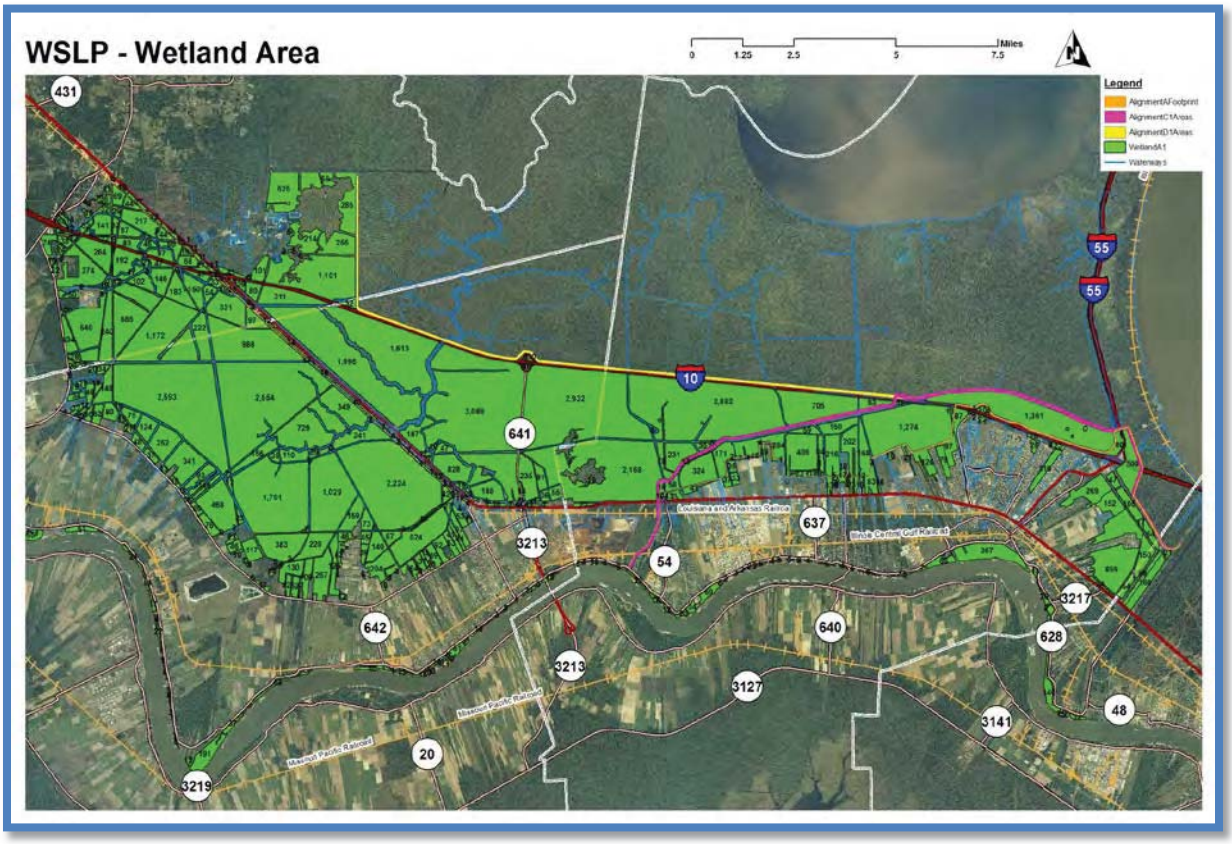


Figure 4-3: Wetland areas within each alternative in the final alternative array.

At this stage of the study, we have yet to conduct a traditional habitat impact analysis using the Wetland Value Assessment WVA methodology. In an effort to assess the scope of potential habitat impacts associated with the various alternatives, project-induced impacts to habitats were preliminarily determined utilizing existing information about the area from the Coastwide Reference Monitoring System CRMS).

In order to assess the impacts of the alternative alignments on the habitat, data was obtained from the CRMS Site Level Report Cards for sites CRMS0059, CRMS5373, CRMS0039, CRMS5167 and CRMS0065 which are most applicable to the project location. In these reports three indices have been developed: a floristic quality FQI , hydrologic HI and submergence vulnerability SVI .

To assess the proposed levee alignment habitat impacts, data was obtained from the CRMS Site Level Report Cards for sites CRMS0059, CRMS5373, CRMS0039, CRMS5167 and CRMS0065; which are most applicable to the project location. These reports present three indices: floristic quality FQI), hydrologic HI) and submergence vulnerability SVI . CRMS Analytical Teams, made up of agency and academic personnel, developed these indices based on the suite of parameters available from the 2006 to 2009 CRMS dataset.

The Floristic Quality Index FQI) is used throughout the world to determine wetland quality based on plant species composition for a geographic area of interest. The FQI developed with the CRMS data is specific to coastal Louisiana. FQI scores from 0 to 100 are calculated for a sampling station and are based on the percent cover values and the Coefficient of Conservatism CC score of the species present Cretini et al. 2012). The Hydrologic Index HI

jointly assesses the suitability of two critical aspects of wetland hydrology, average salinity and percent time storm damaged, in maximizing vegetation primary productivity. The HI score between 0 and 100) corresponds to the percent of maximum vegetation productivity expected to occur if the separate effects of salinity and inundation interact in a multiplicative fashion on vegetation productivity Snedden and Swenson 2012). Submergence Vulnerability Index SVI scores are currently unavailable for the five CRMS sites listed above because the data collection thresholds for wetland elevation change and vertical accretion have not been met Personal communication, Sarai Piazza, USGS, May 9, 2013).

Based on proximity of CRMS site locations to proposed alternative alignments, a combination of site CRMS0059 and CRMS5373 was utilized for analyzing habitat impacts of Alternatives A and C TSP . All identified CRMS sites in the area were used for analyzing Alternative D. The FQI of each site by alternative were combined to obtain an average, and then converted the Index number into 0.1 to 1.0 range. The same process was utilized for determining the HI. Unfortunately the HI was unavailable for sites CRMS0059 and CRMS0065 because those sites did not meet salinity and/or water level data completeness threshold 70 percent per water year) in order to calculate an HI score. Next the FQI and HI 0.1-1.0 numbers were averaged to obtain a single number to apply for habitat quality for each alternative. Note that the FQI is calculated on herbaceous vegetation. The CRMS Analytical Teams have developed a Forested FQI that accounts for trees; however, it is still undergoing peer review. Though the Forested FQI would have been preferred, the herbaceous FQI is still useful as a comparison evaluation between alternatives.

The results of this analysis are presented in Table 4-3 and Table 4-4**.** Alternative C and Alternative A had the same average FQI, which was greater than Alternative D. This analysis also indicates that Alternative C and Alternative A would be equivalent with regard to the FQI used throughout the world to determine wetland quality based on herbaceous plant species composition. Alternatives C (TSP) and Alternative A had the same average combined HI i.e., vegetation primary productivity and FQI which was greater than Alternative D. These results indicate that the habitat quality for both Alternative C and Alternative A project areas are equivalent and greater than the habitat quality in Alternative D project area. The FQI score for each of the final array of alternatives was compared to both the Pontchartrain Basin Scale and Coastwide Scale FQI scores of 2006 through 2012.

Table 4-3: Average FQI, minimum and maximum FQI, and FQI converted to values between 0.1 – 1.0 for each alternative in the final alternative array.

Alternative	Average FQI	Minimum FQI	Maximum FQI	Average converted FQI
Alternative A and C	19.78592	16.12832	23.44351	0.197859
Alternative D	18.45094	14.13925	22.76262	0.184509

Table 4-4: HI, FQI, and average of the combination of HI and FQI for each alternative in the final alternative array.

Alternative	HI	FQI	Average of HI + FQI
Alternative A and C	0.864	0.197859	0.53093
Alternative D	0.769285714	0.184509	0.476898

Although this approach is not ideal for developing habitat quality, given the expedited time line and available data, this approach, because it was data driven, was considered to be better than any other option available until detailed feasibility-level habitat analysis can be conducted. Eventually the CRMS Analytical Teams may develop formulas to combine these indices into a

single number, which would be greatly used. Unfortunately, that method is not yet developed, so we decided to maintain a simplified approach in using averages. It is expected that once feasibility analysis is conducted on the Alternative C, an interagency team will conduct a full habitat evaluation using the Wetland Value Assessment WVA) methodology.

Indirect Impacts: Alternative C could potentially indirectly impact up to approximately 8,424 acres of primarily forested wetlands/swamp habitats used by fish and wildlife for shelter, nesting, feeding, roosting, cover, nursery and other life requirements. This would include cypress-tupelo swamp, the bald eagle, alligator snapping turtles, osprey, paddlefish, manatee, swamp milkweed, floating antler fern and rooted spike-rush LDWF 2013 , listed species and rare, unique or imperiled vegetative communities in the project area. However, preliminary hydrologic modeling indicates that the project design would have minimal changes to flows or stages on either the protected or unprotected sides. To accomplish this, the proposed levee system designs would include culverts with sluice gates joining directly with each of the existing culverts under I-10. Similarly, culverts would be included within the levee system along those levee reaches presently open to the surrounding wetlands system in order to retain hydrologic connectivity between the protected and unprotected areas. These structures would only be closed on average for 1.7 storm events annually, or about 8.5 days annually.

Additional indirect impacts would be the potential prevention of saltwater intrusion into the levee-enclosed system when structures are closed for hurricane/tropical storm surge events. Gates, such as along the Reserve Relief Canal and levee culverts would be closed for hurricane/tropical storm surge events on average frequency of about 1.7 times per year; which would result in the closure of the levee system for an average duration of about 8.5 days per year. Closure of the levee system during these storm surge events would reduce minor salt water intrusion into wetland habitats enclosed by the levee system. This could provide some reduction of the potential ecological stresses associated with saltwater intrusion and could also help reduce the conversion of existing forested wetlands and swamps to marsh and open water habitats.

It is unknown at this stage of the study process how water levels within the enclosed system would be managed with regard to increased in RSLR. It is also unknown the magnitude of the potential for substantial additional indirect impacts to enclosed forested wetlands, swamp and fish and wildlife resources. Later phases of this study will analyze and determine the extent of potential indirect impacts due to operation of the alternatives.

Cumulative Impacts: Cumulative impacts would be the incremental direct 856 acres and indirect up to 8,424 acres) impacts of implementing and operating Alternative C on vegetation resources plus the direct and indirect impacts attributable to other previous, existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A

Direct Impacts: Direct impacts would be similar to Alternative C with the following exceptions: of the total of 411 acres directly impacted, 358 acres of forested wetlands and swamp, 18 acres of BLH, for a total of approximately 376 acres of wetland vegetation would be directly impacted.

Indirect Impacts: Indirect impacts would be similar to Alternative C except 3,564 acres of forested wetlands and swamp habitat could be impacted.

Cumulative Impacts: Cumulative impacts would be similar to Alternative C with these exceptions: there would be an incremental total of 376 acres of direct impacts and up to

3,564 acres of indirect impacts plus the direct and indirect impacts attributable to other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative D

Direct Impacts: Direct impacts would be similar to Alternative C with the following exceptions: approximately 1,115 acres of forested wetlands and swamp could be directly impacted.

Indirect Impacts: Indirect impacts would be similar to Alternative C except up to 56,228 acres could be impacted.

Cumulative Impacts: Cumulative impacts would be similar to Alternative C with the following exceptions: there would be an incremental total of 1,115 acres of direct impacts and up to 56,228 acres of indirect impacts plus the direct and indirect impacts attributable to other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

4.3.3 Wildlife Resources

Alternative C

Direct and Indirect Impacts: Of the 856 acres impacted, approximately 775 acres are primarily forested wetlands and swamp habitats along the reach of the proposed alignment located north of US-61; and approximately 18.29 acres of dry and/or wet BLH are located along the reach of the alignment south of US-61. Up to approximately 8,424 acres of primarily forested wetlands/swamp wildlife habitats would be indirectly impacted. However, preliminary hydrologic modeling indicates the project design would have minimal changes to flows or stages on either the protected or unprotected sides. It is anticipated that during detailed feasibility-level design, the levee system hydrologic connectivity would be more fully designed and optimized to retain hydrologic connectivity between areas that are within and outside of the levee alignment.

Wildlife access into and out of the levee-enclosed system would not be significantly impacted as most wildlife are highly mobile. However, aquatic wildlife would be temporarily restricted from entering the project area on average about 8.5 days per year due to closure of the levee system during hurricane/tropical storm surge events. Closure of the levee system during these storm surge events would reduce minor salt water intrusion into wetland habitats enclosed by the levee system. This could provide some reduction of the potential ecological stresses associated with saltwater intrusion and could also help reduce the conversion of existing forested wetlands and swamps wildlife habitat to marsh and open water habitats thereby protecting enclosed cypress-tupelo swamp for continued wildlife use. This would be especially important as RSLR is projected to increase.

Cumulative Impacts: Cumulative impacts would be the incremental direct 856 acres) and indirect up to 8,424 acres) impacts of implementing and operating Alternative C on wildlife resources plus the direct and indirect impacts to wildlife resources attributable to other previous, existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A

Direct, Indirect and Cumulative Impacts: Direct impacts would be similar to Alternative C with the following exceptions: of the total of 411 acres directly impacted, approximately 358 acres of forested wetlands and swamp wildlife habitat and approximately 18 acres of BLH wildlife habitat, for a total of approximately 376 acres of wetland habitats, would be directly impacted. Indirect impacts would be similar to Alternative C except up to approximately 3,564 acres could be affected. Cumulative impacts would be similar to Alternative C with the following exceptions: there would be an incremental total of about 376 acres of wildlife habitats directly impacted and

up to approximately 3,564 acres of indirect impacts on habitats utilized by wildlife resources, in addition to the direct and indirect impacts attributable to other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative D

Direct, Indirect and Cumulative Impacts: Direct impacts would be similar to Alternative C with these exceptions: of the total of 1,181 acres directly impacted, approximately 1,115 acres of forested wetlands and swamp wildlife habitat would be directly impacted. Indirect impacts would be similar to Alternative C except that approximately 8,424 acres could be affected. Cumulative impacts would be similar to Alternative C with the following exceptions: there would be an incremental total of 1,115 acres of direct impacts to wildlife habitat and up to approximately 56,228 acres of indirect impacts and the direct and indirect impacts attributable to other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

4.3.4 Aquatic and Fisheries Resources

Alternative C

Direct and Indirect Impacts: Approximately 719 acres of existing benthos swamp habitat would be converted into upland grass covered levee) habitat. Sessile organisms would be buried during construction. Mobile species of fish, shellfish and other aquatic resources would either avoid the area during construction (fish) or be moved out of the way due to water displacement plankton). Up to 8,424 acres of forested wetland and swamp habitats utilized by aquatic and fishery recourses could be indirectly impacted. However, preliminary hydrologic modeling indicates that the project design would have minimal changes to flows or stages on either the protected or unprotected sides. It is anticipated that during detailed feasibility-level design, the proposed levee system hydrologic connectivity would be more fully designed and optimized to retain hydrologic connectivity between areas that are within and outside of the levee alignment.

Aquatic organism access into and out of the proposed action area would be impacted; additional culverts may deter some species from swimming through those structures. Aquatic species would be temporarily restricted from entering the proposed action area on average about 8.5 days per year due to closing gates and culverts in preparation for storm surge. This impact could be significant for the catadromous American eel that needs the fresh water areas for development and access to the ocean for breeding. If the closures occur, when the elvers stage enter the swamps there would be a recruitment age class loss. For marine species the impact would not be significant because their movement into the area is less dependent on tidal action and stage of development. Fresh water species would breed in the enclosed area for the most part and would not be indirectly impacted by the closure.

Cumulative Impacts: Impacts would be the incremental direct 719 acres) and indirect up to 8,424 acres impacts of implementing Alternative C and impacts attributable to other previous, existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A

Direct, Indirect and Cumulative Impacts: Direct impacts would be similar to Alternative C with the following exceptions: approximately 358 acres of benthos would be directly impacted. Indirect impacts would be similar to Alternative C except Alternative A would enclose approximately 3,564 acres of aquatic habitat; hence, there would likely be a less significant impact on the American eels. Cumulative impacts would be similar to Alternative C with the following exceptions: there would be an incremental total of about 358 acres of aquatic habitats directly impacted and up to about 3,564 acres of indirect impacts on these resources. These incremental impacts would be in addition to the direct and indirect impacts attributable to other

existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative D

Direct, Indirect and Cumulative Impacts: Direct impacts would be greater than Alternative C because approximately 1,115 acres of benthos would be directly impacted. Indirect impacts would be greater than Alternative C. Approximately 56,228 acres of aquatic habitats would be enclosed in the levee system; hence, a greater significant impact on American eels. Cumulative impacts would be similar to Alternative C with these exceptions: there would be an incremental total of about 1,115 acres of aquatic habitats directly impacted and up to 56,228 acres of indirect impact on these resources plus the direct and indirect impacts attributable to other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

4.3.5 Essential Fish Habitat (EFH)

Alternative C

Direct, Indirect and Cumulative Impacts: Alternative C would have no direct, indirect, or cumulative impacts on EFH since no EFH intersects the proposed alignment or the proposed enclosed area in the near term Figure 2-7 . Closure of the levee system during hurricane/tropical storm surge events would reduce minor salt water intrusion into wetland habitats in the proposed levee system. This could provide some reduction of the potential ecological stresses associated with saltwater intrusion and could also help reduce the conversion of existing forested wetlands and swamps to marsh and open water habitats EFH). If operating plan changes close the levee system more often due to RSLR, then those impacts would have to be analyzed and documented in a future supplemental NEPA document. The incremental direct and indirect impacts would be in addition to the direct and indirect impacts to EFH attributable to previous, existing and authorized levee systems implemented in the Pontchartrain Basin, the State and the Nation.

Alternative A

Direct, Indirect and Cumulative Impacts: Impacts would be similar to Alternative C. There would be a lower risk that a change in operating plan, due to RSLR, would have an adverse impact on EFH because there would be fewer acres of forested wetlands and swamp habitat susceptible to habitat conversion which would be enclosed by Alternative A.

Alternative D

Direct and Indirect Impacts: There would be no direct impact to white shrimp EFH. There would be direct impacts to red drum EFH where the gate on Blind River is built. The soft bottom habitat, EFH red drum habitat, in the footprint would be permanently removed from use. There would be no indirect impact on white shrimp EFH. Indirect impacts to red fish EFH would occur. Red drum EFH areas located within the construction turbidity plume may not be usable during construction. However, this impact would be temporary. The EFH area of Blind River inside the proposed levee system could be slightly less accessible by red fish after the levee structure is in place. However, the intent of the tentative levee design is to allow for existing flows and cross sections and should not hinder red fish access.

Cumulative Impacts: Impacts would be similar to those of the future without-project conditions. Closure of the levee system during hurricane/tropical storm surge events would reduce minor salt water intrusion into wetland habitats enclosed by the levee system. This could provide some reduction of the potential ecological stresses associated with saltwater intrusion and could also help reduce the conversion of existing forested wetlands and swamps to open water EFH. It is unknown at this stage of the study process how water levels within the enclosed system would respond with regard to increased in RSLR. The magnitude of the potential for substantial

additional indirect impacts to enclosed forested wetlands, swamp and EFH is also unknown. These incremental direct and indirect impacts would be in addition to the direct and indirect impacts to EFH attributable to previous, existing and authorized levee systems implemented in the Pontchartrain Basin, the State and the Nation.

4.3.6 Threatened and Endangered Species

Alternative C

Direct and Indirect Impacts: Based on review of existing data and preliminary field surveys, the CEMVN finds that implementation of the proposed action would have no effects on any known listed species or their critical habitat, Bald eagles or colonial nesting waterbirds. Alternative C would directly impact (destroy) the following acres of habitats potentially utilized by listed species, the bald eagle and colonial nesting waterbirds: a total of 856 acres with approximately 775 acres of primarily forested wetlands and swamp habitats along the reach of the proposed alignment located north of US-61; as well as the approximately 18.29 acres of dry and/or wet BLH along the reach of the alignment located south of US-61. Other, adjacent forested wetlands and swamp habitats are available for use by listed species, the Bald Eagle and colonial nesting waterbirds. Alternative C could potentially indirectly degrade up to approximately 8,424 acres of primarily forested wetlands/swamp habitats potentially utilized by listed species, the bald eagle and colonial nesting waterbirds. However, preliminary hydrologic modeling indicates that the project design would have minimal changes to flows or stages on either the protected or unprotected sides. It is anticipated that during detailed feasibility-level design, the proposed levee system hydrologic connectivity would be more fully designed and optimized to retain hydrologic connectivity between areas that are within and outside of the levee alignment.

Access into and out of the project area would not be significantly impacted for the bald eagle or colonial nesting waterbirds. Gulf sturgeon and the West Indian Manatee would be temporarily restricted from entering the proposed action area on average about 8.5 days per year due to closing gates and culverts in preparation for storm surge events.

To deter colonial nesting water birds from establishing active nesting colonies in the construction areas, a Nesting Prevention Plan would be developed, in coordination with the USFWS and LDWF. If measures to prevent colonial nesting bird populations are not successful in the area, construction-related activities that would occur within 1,000 feet of a colony could be restricted to the non-nesting period, which in this region generally extends from September 1 to February 15, depending on the species present. This restriction would likely pose significant problems to construction activity schedules. If wading bird nesting colonies become established in the area, the 1,000 foot buffer must be maintained unless coordination with the USFWS indicates that the buffer zone may be reduced based on the species present or an agreement is reached with USFWS that allows a modified process to be adopted.

Alternative C would have no effect on any of the listed species or their critical habitat, Bald Eagles or colonial nesting waterbirds. There are existing Bald Eagle nests in the area; however, based on information provided by USFWS, all nests are beyond 1,500 feet from the proposed project alignments. Two potentially active waterbird rookeries exist within 1,000 feet of the proposed alignments. Before construction the USFWS and CEMVN will survey the area to confirm if the rookeries are active or not. USFWS guidelines would be utilized during construction to avoid any impacts to above described species, if encountered.

Cumulative Impacts: Impacts would be the incremental direct convert 856 acres to levee habitat and indirect enclose and change hydrologic exchange of up to 8,424 acres impacts of implementing and operating Alternative C on forested wetlands and swamps and other less

numerous habitats potentially utilized by listed species, the bald eagle and colonial nesting waterbirds. These incremental impacts would be in addition to the direct and indirect impacts to listed species, the bald eagle and colonial nesting waterbirds by other previous, existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A

Direct, Indirect and Cumulative Impacts: Direct impacts would be similar to Alternative C with theses exceptions: of the total 411 acres directly impacted, approximately 358 acres are forested wetlands and swamp habitat and approximately 18 acres are BLH habitat; for a total of 376 acres of wetland habitats directly impacted (destroyed). Other, adjacent forested wetlands and swamp habitats are available for use by listed species, the bald eagle and colonial nesting waterbirds. Indirect impacts would be similar to Alternative C except up to 3,564 acres could potentially be indirectly impacted. The implementation of Alternative A would have no effect on any listed species or their critical habitat, Bald Eagles or colonial nesting waterbirds. Cumulative impacts would be similar to Alternative C with these exceptions: there would be an incremental total of about 376 acres of direct impacts and up to approximately 56,228 acres of indirect impacts to forested wetlands, swamps and other wetland habitats utilized by listed species, the bald eagle and colonial nesting waterbirds plus the direct and indirect impacts of other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative D

Direct, Indirect and Cumulative Impacts: Direct impacts would be similar to Alternative C with the following exceptions: of the total 1,181 acres potentially impacted by implementation of Alternative D, approximately 1,115 acres of forested wetlands and swamp habitats potentially utilized by listed species, the Bald Eagle and colonial nesting waterbirds would be directly impacted. Indirect impacts would be similar to Alternative C except up to 56,228 acres could be potentially impacted. Cumulative impacts would be similar to Alternative C with these exceptions: there would be an incremental total of about 1,115 acres of direct impacts and up to about 56,228 acre of indirect impacts to forested wetlands, swamps and other wetlands potentially utilized by listed species, the bald eagle and colonial nesting waterbirds. These incremental project-induced impacts would be in addition to the direct and indirect impacts of other existing and authorized levees in the Pontchartrain Basin, the State and the Nation.

4.3.7 Cultural and Historic Resources

Alternative C

Direct and Indirect Impacts: With a total footprint of 856 acres, Alternative C has a chance to directly affect any recorded cultural resources or an unrecorded cultural resource that may exist within its footprint, or its borrow source or mitigation areas. Site 16SJB68 is located at the western end of Alternative C, and would require further investigation as to whether it may be adversely affected by construction of Alignment C (TSP). There are no other currently recorded cultural resources within the Alternative C footprint. A large portion of the Alignment C TSP) footprint has been surveyed via inclusion in cultural resource surveys for other purposes with no cultural resources recorded or expected. Regardless, portions of Alignment C (TSP), especially those closes to waterways, do retain a likelihood to contain unrecorded cultural resources that could be damaged by the construction of Alignment C (TSP). Indirect impacts of Alignment C TSP would not be substantial. Known or unknown cultural resources on either side of the alignment could receive indirect impacts via hurricane/tropical storm surge damage events.

Cumulative Impacts: Cumulative impacts would be the incremental direct and indirect impacts of implementing Alternative C plus the direct and indirect impacts to cultural resources by other previous, existing and authorized levees in the Pontchartrain Basin, the State and the Nation.

Alternative A

Direct, Indirect and Cumulative Impacts: Direct impacts would be similar to Alternative C. Site 16SJB68 overlaps the western edge of Alignment A, and would require testing to determine if adverse impacts may occur to the resource by construction of Alternative A. There are no other currently recorded cultural resources within the Alternative A footprint. An alignment similar to Alignment A was surveyed for cultural resources in 2003 and found no cultural resources. Previously unsurveyed areas of Alignment A will need to be examined for potential cultural resources before construction. Cumulative impacts would be similar to Alternative C.

Alternative D

Direct, Indirect and Cumulative Impacts: Direct impacts would be similar to Alternative C with exception that Alternative D has a footprint of 1,181 acres. Alternative D does not directly intersect any recorded and known cultural resources. There are cultural resources recorded in close proximity. Alternative D crosses many natural waterways considered high potential areas for cultural resources. Indirect and cumulative impacts would be similar to Alternative C.

4.3.8 Aesthetics and Visual Resources

Alternative C

Direct Impacts: Alternative C footprint is wider than Alternatives A or D giving it a wider direct area of effect. Even with this wider footprint, direct impacts to visual resources would be minimal in residential and agricultural areas. Much of the levee system would be in areas that are screened by deep forest and swamp, or are remote and have minimal access. Residential areas near the levee construction may see increases in dust and noise levels during construction. This is a temporary impact and conditions should return to preconstruction levels after completion of the project. View sheds from I-10 may also be altered near the intersection with I-55 and further west where the proposed levee crosses under the interstate. Where once a natural landscape of water, marsh, or swamp could be seen, a green topped levee with a wide footprint and storm damage walls would now be seen. The proposed levee system intersects and crosses the Maurepas Swamp WMA boundaries. In those areas, access for recreation will be limited.

Indirect Impacts: The River Road Scenic Byway may see temporary impacts due to truck traffic and construction vehicles, but impacts would be minimal. Construction of the proposed levee system would most likely require a storm damage control gate or other structure across US-61. This could reduce the visual quality of the drive along the Byway. The affected area of wetlands south of the proposed levee system could be approximately 8,424 acres which could change the landscape of the region due to water channel and drainage way closures or redirections.

Cumulative Impacts: Hydrologic units and drainage throughout the area of effect would be dramatically changed due to the introduction or enlargement of a large levee system to the area. Existing canals and channels could be altered or closed, changing water flows and altering the landscape. Cumulative impacts would be the incremental direct and indirect impacts of implementing Alternative C on visual resources plus the direct and indirect impacts by other existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A

Direct, Indirect and Cumulative Impacts: Direct impacts to the visual resources would be similar to those described under Alternative C except the footprint of Alternative A is smaller in size than that of Alternative C. Indirect impacts to the visual resources would be similar to those described under Alternative C. The affected wetlands would be much less than the TSP with only 3,564 acres of potential impacts. Cumulative impacts would be similar to Alternative C.

Alternative D

Direct, Indirect and Cumulative Impacts: Direct, indirect and cumulative impacts to resources would be similar to those for Alternative C with the exception of the Blind River, a designated Wild and Scenic River, longer levee and potential impacts to 56,228 acres of wetlands.

4.3.9 Recreation Resources

Alternative C

Direct Impacts: Approximately four miles of the levee is within the Maurepas Swamp WMA. Depending on levee designs, the WMA may be less accessible by land and water to recreation users. The LDWF boat launches at the Hope Canal and Reserve Relief Canal, Cajun Pride Swamp Tours, the I-55 launch and the I-10 launch; and a recreational camp within the levee alignment would be affected by the proposed action. Nonstructural measures impacts could include raising buildings, such as visitor and community centers; but would not include effects on outdoor facilities such as golf courses, swimming pools, tennis courts, boat launches, playgrounds, or ball fields. Facilities that are raised would benefit from the added protection. Buyouts of facilities may decrease recreational opportunities for the community.

Indirect Impacts: Recreationists may have less access to Maurepas Swamp WMA. Boat launches may be closed permanently, closed during construction, or relocated. People with recreational camps may not be able to access their camps. Impacts to boat launches and camps could be mitigated through compensation, relocation, or other appropriate measures.

Cumulative Impacts: Area diversion projects LCA CBRD and the Maurepas Diversions would provide fresh water and improve wetlands. The WSLP project could decrease salt water intrusion resulting from hurricane/tropical storm surge events, which would improve fish and wildlife habitat and increase opportunities for fresh water fishing and hunting. As levees are built, recreational access through canals and bayous would decrease, but recreational infrastructure would realize a reduction in risk of damage from hurricane/tropical storm surge events. These incremental direct and indirect impacts would be in addition to direct and indirect impacts to recreation resources attributable to other previous, existing and authorized levee systems in the Pontchartrain Basin, the State and the Nation.

Alternative A

Direct, Indirect and Cumulative Impacts: Direct impacts would be similar to Alternative C with the following exceptions. The LDWF Hope Canal boat launch 0.2 mile north of Alternative A would not be impacted. There would be impacts to waterway access to the Hope Canal rather than the launch itself. The levee alignment crosses the access road to a recreational camp and would block access to it. Indirect and cumulative impacts would be similar to Alternative C.

Alternative D

Direct, Indirect and Cumulative Impacts: Direct impacts would be similar to Alternative C except there would be an additional 16 miles of levee alignment impacts to the Maurepas Swamp WMA. This alternative would impact waterway access to the Hope Canal rather than the launch itself. Additionally, the alignment would block water access to the St. James Boat Club and the US-61 boat launch. Indirect impacts would be similar to Alternative C. Cumulative impacts would be similar to Alternative C; however this alternative would limit recreational access to the Maurepas Swamp WMA to a greater extent because of the greater length of the alignment.

4.3.10 Noise

Alternative C

Direct, Indirect and Cumulative Impacts: There would be temporary and localized increased

noise levels related to construction. Most of the alignment is remote and unpopulated so noise would not affect any nearby communities. The area south of US-61 and in the general vicinity of the I-10/I-55 intersection is populated and may be impacted by construction noise. After construction, noise levels would return to pre-construction conditions. Construction equipment is limited in the level of noise that can be emitted. Institutional recognition of noise, such as the regulations for Occupational Noise Exposure 29 CFR §1910.95) under the Occupational Safety and Health Act of 1970, as amended, would continue. This mandates that noise levels emitted from construction equipment be below 90 dB for exposures of eight hours per day or more. Noise may cause some temporary and minor annoyance to residents adjacent to the proposed alignment south of US-61 and business customers and workers e.g., Shell gasoline station and casino) near the intersection of I-10/I-55. However, the Occupational Noise Exposure 29 CFR §1910.95) under the Occupational Safety and Health Act of 1970, as amended, would continue. Local fish and wildlife species may relocate during construction. Noise effects are expected to be localized, temporary and minor. Administrative and/or engineering controls, determining and implementing appropriate buffer zones, and implementing construction activity windows, shall address these issues. Any cumulative impacts would be temporary and minor in nature.

Alternative A

Direct, Indirect and Cumulative Impacts: Direct, indirect and cumulative impacts would be similar to Alternative C except over a smaller area.

Alternative D

Direct, Indirect and Cumulative Impacts: Impacts would be similar to Alternative C except there would be no impacts to residents south of the I-10 or US Highway 61; and there would be greater temporary and minor impacts to fish and wildlife resources along the longer alignment.

Figure 4-4: Laplace, Louisiana after Hurricane Isaac.

5.0 TENTATIVELY SELECTED PLAN (*NEPA Required)

Alternative C is the Tentatively Selected Plan TSP . Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final Report.

5.1 Description of the Tentatively Plan

The TSP is an 18.27-mile risk reduction system around the communities of Montz, Laplace, Reserve and Garyville with non-structural components in St. James Parish. The alignment of the TSP is shown in Figure 3-4. The risk of storm surge damage would be reduced for over 7,000 structures and four miles of I-10 located in the system. Inclusion of this segment of I-10 would help maintain a major emergency evacuation and re-entry route for residents of southeast Louisiana, including residents in the New Orleans metropolitan area. The TSP also includes non-structural measures for 1,571 structures in the communities of Gramercy, Lutcher and Grand Point that are located outside of the proposed levee system. It is estimated that these non-structural measures would include elevation of 1,481 structures and acquisition of 90 structures. Implementation of non-structural features will be developed in more detail during feasibility level of design and analysis during which time an economic analysis will be conducted based on economic reaches. In developing the plan, consideration with be given to community cohesion and the requirements of EO 12898.

The structural component of the system would consist of earthen levees, floodwalls T-walls), floodgates, drainage structures and pump stations located along the alignment. The preliminary level of design, based on modeling for a 1 percent AEP storm event includes levee elevations that would range from +13.5 NAVD88 on the eastern reaches near the Bonnet Carré Spillway to +7.0 NAVD88 in the western portion of the project area. They would be constructed with 3:1 side slopes with a 10-foot crown width. Construction of levees would involve the placement of 3,100,000 cubic yards of compacted and uncompacted clay borrow) material on top of 3,400,000 square yards of geotextile fabric. Approximately 26,124 cubic yards of aggregate limestone would be used to build a road on the levee crown. A conveyance canal at a depth of -10 ft. NAVD88 would be situated along the levee. Floodwalls would be located under the I-10/I-55 interchange and other areas where space is limited. Nine floodwall sections would span 5,304 linear feet over the length of the system. The system would include 2,080 feet of drainage gates, 288 feet of roadway gates, two railway gates, and thirty-six pipeline crossings. Four pump stations would be located along the alignment to ensure the project does not adversely impact local drainage. Design parameters will be further refined during feasibility level design and analysis which may result in changes to the design parameters; however the TSP is anticipated to reduce risk for at minimum a 1 percent AEP storm event but not exceed a 0.5 percent AEP storm event.

The TSP would maintain hydrologic connectivity to the extent practicable through the use of water control structures except during closure for hurricane and tropical storm surge events. When the system is closed, pumps would operate on average for 1.7 storm events per year, which equates to closure of structures on average 8.5 days per year.

The structural alignment would directly convert approximately 856 acres to uplands including approximately 775 acres of hydric soils, 14.8 acres of water bottoms and 55.4 acres of prime farmlands. Approximately 8,424 acres of wetlands could be indirectly impacted due to enclosing the project area within the levee system. Further investigation is required to determine if cultural resources are located within any part of the footprint. Additional environmental investigations will be performed during feasibility-level design and analysis.

The estimated cost of the TSP is $880,851,070. The BCR for the TSP is equal to 1.63 to 1 with annualized net benefits equal to approximately $23,000,000.

5.1.1 Real Estate Requirements

A Real Estate Plan REP) describing the real estate requirements and costs for the project can be found in Appendix C. The REP was prepared with estimated right-of-way (ROW requirements based on available information. The REP and real estate cost estimates will be revised during feasibility-level design and analysis.

The estimated cost of real estate acquisition for structural features is $3,283,000. The alignment follows State-owned land and the property of approximately 120 owners. A standard perpetual levee easement for approximately 856 acres will be acquired for the construction of levees and floodwalls. A non-standard perpetual underground piling easement will also be acquired for all floodwalls. A standard Drainage Ditch Easement would be acquired for the areas needed for the conveyance canal. Borrow material for this project would come from the Bonnet Carré Spillway which is owned in fee by the Federal Government or from alternative sources not yet identified. A standard temporary work area easement will be acquired for staging areas. Mitigation land will be acquired in fee, excluding rights to minerals with restrictions on use of surface). A non-material deviation will be made to the standard road easement to revise the rights necessary for a temporary non-exclusive road access Appendix C).

The estimated cost of real estate acquisition for the non-structural feature is $81,417,000. Approximately 1,571 landowners may be impacted by this feature. The feature entails property acquisitions and structure raisings. At this time there has not been sufficient evaluation to determine particular structures to be included in the feature. A detailed evaluation of the work entailed in structure raising will be accomplished during the feasibility level design and analysis. At that time, the appropriate real estate interests to be acquired for non-structural measures will be determined, and the real estate costs will be refined. Displaced persons and businesses may be entitled to Public Law 91-646, Title II Relocations Assistance.

The total estimated cost of real estate for the project is $84,700,000. The CPRAB will have the responsibility of acquiring all necessary real estate interests for the project.

5.1.2 Relocation Assistance

Levee construction may cause relocations and/or temporary interruptions to pipelines. The existing carrier line would remain in operation while a bypass line would be constructed through a sleeve in the T-wall cutoff piles. When a bypass is complete and in place, the tie-in with the existing line would follow. Potential cost of this work is presented in Table 5-1. Detailed information will be developed during feasibility-level design and analysis.

Table 5-1: Unit cost of pipeline relocations.

Description	Estimated Quantity	Cost
≤6" Diameter	14	$515,000 each
>6" to ≤12" Diameter	16	$700,000 each
>18" to ≤24" Diameter	5	$1,550,000 each
> 24" Diameter	1	$1,920,000 each

5.1.3 Operation and Maintenance, Repair, Rehabilitation and Replacement

The purpose of operation and maintenance, repair, rehabilitation and replacement OMRR&R) is to sustain the constructed project. The estimated annual OMRR&R cost is $4,128,075 (Table 3-4). This estimate will be further refined during feasibility-level design and analysis. After the

District Engineer provides notice of construction completion for the project, or functional portion of the project, the CPRAB will commence OMRR&R responsibilities associated with the project.

5.1.4 Benefit Analysis

Project Benefits

Models were run to determine the effects of storms on area resources. Hydrologic modeling results were developed to help establish the existing and future conditions and determine potential measures needed to address surge and storm-related damages. A database of values, types, and first floor elevations was developed for all structures in the area. This information was compared to the surge modeling to determine storm damages. Maps showing inundation of structures that could be damaged under FWP conditions will be developed.

Mitigation Plan Benefits

Habitat value analysis will be completed during feasibility-level design and analysis. Ecological model results will be combined with cost data to develop mitigation plans.

5.1.5 Risk & Uncertainty Analysis

Risk and uncertainty are intrinsic in water resources planning and design. This section describes various categories of risk and uncertainty pertinent to the study. Risk and uncertainty will be further considered during feasibility-level design and analysis.

5.1.5.1 Environmental Factors

Relative Sea Level Rise*:* There is uncertainty about how much sea level change SLC) would occur in the region. Higher than estimated RSLR could cause salt water intrusion into the freshwater swamp causing significant changes to this habitat.

An assessment of RSLR was included in plan formulation and alternatives analysis. The evaluation of RSLR is documented in Appendix B and will be refined during feasibility level design and analysis. Calculations based on EC 1165-2-212 determined that the low, intermediate and high rates of RSLR at 2070 are 1.81 feet per year, 2.32 feet per year, and 3.95 feet per year, respectively Table 2-2). The intermediate RSLR rate was applied.

RSLR could impact the benefits achieved by the TSP. Because the project was developed using the intermediate RSLR rate, the TSP would provide more benefits than anticipated should the low RSLR rate result and less benefits with the high RSLR rate. The non-structural component would be less effective because structures would have to be raised to a height that would increase their risk from wind damage during a storm.

Storms: Risks associated with the TSP are primarily related to the possibility of extreme weather events. The uncertainty of the size or frequency of storms and meteorological events, such as El Nino and La Nina, cannot be predicted over a set period of time. The storm record is constantly being updated and a large storm such as Hurricane Katrina or a slow moving storm such as Isaac can alter the expected return period for other storms. To reduce the uncertainties of storm events, storms with varying degrees of size, intensity, and path are included in the modeling. By using a long-term record of different storm scenarios, the effects of such storms are incorporated into the modeling. The team is then able to reduce the uncertainty in the determination of project benefits (Appendix B).

5.1.5.2 Engineering Factors

Levee/Structure Failure: The risk associated with the levee/structure system is its stability. Analysis of the earthen levee and associated T-walls and gates will be evaluated during feasibility-level design and analysis, and included in Appendix B. The levee and other features will be constructed to meet USACE standards.

Hydrologic Flows: There is uncertainty as to whether the levee system would potentially induce flooding internally and externally to the levee alignment. Modeling results will be analyzed during feasibility level design and included in the final report. Hydrologic modeling ADCIRC and STWAVE) will show if the TSP could potentially induce flooding in these area and allow for more accurate engineering and design of the levee system. The project will incorporate features to mitigate for any potential induced flooding.

The risk of running the ADCIRC and STWAVE models is the assumption that the models appear to provide a specific response on the TSP in any given scenario; however it is only a representative point of reference in a complex system. While the analysis is enhanced by the models, application of the models can introduce error and uncertainty. Calibration and verification efforts are employed so that the models more closely replicate observed changes or at least provide insight into the limitations of the model.

Models are limited by basic, underlying assumptions and uncertainties. Some of the simplifying assumptions include the model parameters. A sensitivity discussion will be completed during feasibility-level design and analysis and included in Appendix B of the final report. Another uncertainty is that a limited number of storm scenarios are modeled. It is assumed that various storm scenarios over a number of years will represent a much higher indicator of the levees ability to withstand major storm events.

The models also use available historic data to extrapolate future storm conditions and frequency. The size and frequency of storms included in the model are based on statistical analysis but do not account for meteorological changes, such El Nino and La Nina effects, that can increase or decrease storms over a period of several years. Neither do the models account for the potential of increased storms due to climate change.

5.1.5.3 Economic Factors

The risk for economics is in under or overestimating the future benefits associated with the project alternatives. The with-project damages and overall benefits associated with the alternatives were estimated based on the existing and future without-project damages. This could potentially result in the TSP not being economically justified or preliminary estimates of the benefit cost ratios being overstated. A full economic analysis will be conducted during feasibly level design and documented in the final report. Additional uncertainty surrounding variables such as population growth, first floor elevations, structure value, depth damage relationships and additional inputs are consistent with typically accepted project uncertainty.

The Hydrologic Engineering Center Flood Damage Analysis HEC-FDA) Version 1.2.5a certified model was used to calculate the damages for the without project existing and future conditions. Economic and engineering inputs were necessary for the model to calculate damages for existing conditions 2012 , the project base year 2020 and the final year in the period of analysis 2070). The inputs included structure inventory, future development, contents-to-structure value ratios, vehicles, first floor elevations and depth-damage relationships, ground elevations and without-project stage probability relationships.

The uncertainty surrounding each of the economic and engineering variables was entered into the model. Either a normal probability distribution, with a mean value and a standard deviation, or a triangular probability distribution, with a most likely, a maximum and a minimum value, was entered into the model to quantify the uncertainty associated with the key economic variables. A normal probability distribution was entered into the model to quantify the uncertainty surrounding the ground elevations. The number of years that stages were recorded at a given gage was entered for each study area reach to quantify the hydrologic uncertainty or error surrounding the stage-probability relationships.

5.1.5.4 Implementation Factors

Non-structural costs were based on a 100% structural survey of area improvements. Structures located in the 2020 and 2070 100-year floodplains were evaluated by comparing the cost of elevating the structure to the cost of acquiring the structure. The greater cost was used to determine an estimate of the cost of the non-structural feature. Relative sea level rise greatly impacts the number of structures to be raised, resulting in uncertainty as to how many structures would have to be raised. A minimum cost of the non-structural feature of $53,143,789 was developed based on the cost of reducing risk to structures in the 2020 100-year floodplain. A maximum cost of $305,256,794 was developed based on the cost of reducing risk to structures in the 2070 100-year floodplain. During feasibility level of design, the non-structural feature will be further evaluated by economic reach. The resulting evaluation may reduce the number of structures that would be included in the non-structural feature.

5.2 Implementation Requirements

5.2.1 Preconstruction Engineering and Design

Detailed design of the WSLP Project will be shared between CPRAB and the USACE. All detailed design will be in accordance with USACE's regulations and standards.

5.2.2 Construction and LERRD

Construction would be in accordance with the USACE's regulations and standards. Lands, easements, right-of-ways, relocations and disposal areas LERRD) would be the responsibility of the CPRAB Appendix C .

5.2.3 Cost Sharing

The State of Louisiana, acting through the PLD, is the non-Federal sponsor for the feasibility study. The cost-share during the feasibility phase is 50% Federal and 50% non-Federal. Following the feasibility phase, the CPRAB will be the non-Federal Sponsor for the planning, design, construction, operation, maintenance, repair, replacement and rehabilitation of the project. The cost share for the planning, design and construction of the project will be 65% Federal and 35% non-Federal. The CPRAB must provide all project LERRD required for the project. OMRR&R of the project would be a 100% CPRAB responsibility. A full description of the non-Federal and Federal responsibilities after the feasibility phase of the project is contained in Section 8.2 of this report. The OMRR&R costs are estimated to have a present value of $4,128,075 at 2012 price levels and include a 25% contingency. AM M costs are not included in the estimate at this time; those costs will be included in the final report. Table 5-2 presents the cost apportionment.

Table 5-2: Cost apportionment of the TSP.

	Total	Federal	Non-Federal
PED	$7,500,000	$4,875,000	$2,625,000
Construction	$761,051,070	$557,500,446	$203,550,625
Pipeline Relocations	$35,100,000	-	$35,100,000
Lands, Easements, & ROW	$84,700,000	$15,052,750	$69,647,250
Total First Costs**	**$888,351,070**	**$577,428,196**	**$310,922,875**

*** Federal costs are Administrative Cost of Non-Federal Sponsor Oversight**
**** Monitoring and Adaptive Management costs not included.**

5.3 Mitigation Plan

Although mitigation planning was integrated into the overall plan formulation process, implementation of the TSP requires compensatory mitigation for unavoidable project-induced

impacts that will require replacing or providing substitute resources. A mitigation plan for the TSP will be completed following the feasibility level design and analysis and will be included in the final report. Additional information is located in Appendix A.

5.4 Adaptive Management & Monitoring

Incorporation of AM M activities into the mitigation plan will address ecological and other uncertainties that could prevent successful implementation of mitigation project measures. The AM M Plan will establish a framework for decision-making that utilizes monitoring results and other information, as it becomes available, to update project knowledge and adjust mitigation management actions through adaptive management. Integration of AM&M into the mitigation project will ensure success under a wide range of conditions and enable implementing corrective actions in cases where monitoring demonstrates that the mitigation project or measures are not achieving ecological success. An AM M plan will be developed and included as part of the mitigation plan in the final report. Additional information is located in Appendix A.

5.5 Views of the Non-Federal Sponsor

The PLD and the CPRAB support and recognize the importance of hurricane risk reduction in St. Charles, St. John the Baptist and St. James Parishes. This study is included in the 2012 Louisiana Comprehensive Master Plan for a Sustainable Coast and is supported by the Louisiana Congressional delegation. The USACE has worked as a team along with an interagency team and local stakeholders to develop a feasible comprehensive plan that would provide hurricane storm surge risk reduction to the citizens in the area. Construction of the proposed system would immediately allow for improved storm surge risk reduction in the three-parish area, which could potentially reduce life, health and safety risk to residents and interruptions to vital hurricane evacuation routes.

Figure 5-1: St. James Parish flooding after Hurricane Isaac.

6.0 ENVIRONMENTAL LAWS & COMPLIANCE (*NEPA Required)

There are many Federal and state laws pertaining to the enhancement, management and protection of the environment. Federal projects must comply with environmental laws, regulations, policies, rules and guidance in Appendix A. The team coordinated with Federal and state resource agencies during planning and will continue to coordinate. Compliance with laws will be accomplished upon review of this report by appropriate agencies and the public, and with the signing of a Record of Decision by the Assistant Secretary of the Army for Civil Works.

6.1 Clean Air Act of 1972 (Air Quality)

The Clean Air Act CAA) sets goals and standards for the quality and purity of air. It requires the Environmental Protection Agency to set National Ambient Air Quality Standards NAAQS) for pollutants considered harmful to public health and the environment. The project area is in St. Charles, St. James and St. John the Baptist Parishes, which are currently in attainment of NAAQS. The Louisiana Department of Environmental Quality is not required by the CAA and Louisiana Administrative Code, Title 33 to grant a general conformity determination.

6.2 Clean Water Act of 1972 – Section 401 (Water Quality)

The Clean Water Act (CWA sets and maintains goals and standards for water quality and purity. Section 401 requires a Water Quality Certification from the Louisiana Department of Environmental Quality that a proposed project does not violate established effluent limitations and water quality standards. Section 401 compliance will be documented in the final report.

6.3 Clean Water Act of 1972 – Section 404(b)(1) (Wetlands)

The USACE administers regulations under Section 404(b 1) of the CWA, which establishes a program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands. Potential project-induced impacts subject to these regulations will be evaluated during feasibility level design. A completed 404 b 1) evaluation will be included in the final report.

6.4 Coastal Zone Management Act of 1972 (Coastal Zone Development)

The Coastal Zone Management Act is a partnership structure allowing states and the Federal government to work together for the protection of U.S. coastal zones from environmentally harmful over-development. Potential project-induced impacts will be evaluated during feasibility level design. They will be described in a Consistency Determination that will be submitted to the Louisiana Department of Natural Resources to review for consistency with the Louisiana Coastal Resource Program. The determination and findings will be provided in the final report.

6.5 Endangered Species Act of 1973 (Threatened & Endangered Species)

The Endangered Species Act ESA) is designed to protect and recover threatened and endangered T&E) species of fish, wildlife and plants. The CEMVN is coordinating with the USFWS and the National Marine Fisheries Service NMFS) to ensure for the protection of those T&E species under their respective jurisdictions. The USFWS identified in their January 9, 2009 coordination letter two T&E species, the Gulf sturgeon and the West Indian manatee, that are known to occur or occasionally occur in the project area. No plants were identified as being threatened or endangered in the project area. There are no T&E species or their critical habitat under NMFS jurisdiction located in the project area that would be impacted by the proposed action. Based on review of existing data and preliminary field surveys, the CEMVN finds that implementation of the TSP would have no effect on any listed species or their critical habitat.

6.6 Bald and Golden Eagle Protection Act of 1940 (Bald Eagles)

The Bald and Golden Eagle Protection Act protects two eagle species. Bald eagled occur or occasionally occur in the project area. Based on review of existing data and preliminary field surveys, the CEMVN finds that implementation of the TSP would have no effect on bald eagles.

6.7 Louisiana State Threatened and Endangered Species and Rare and Unique Habitat

The Louisiana Department of Wildlife and Fisheries LDWF Louisiana Natural Heritage Program LNHP) lists T&E species, and rare, unique and imperiled habitats in the State of Louisiana. Based on review of the LNHP online database, rare or unique cypress-tupelo swamp habitat, bald eagles, alligator snapping turtles, osprey, paddlefish, manatees, swamp milkweed, floating antler fern and rooted spike-rush is found in the project area (LDWF 2013).

6.8 Colonial Nesting Water Birds

The USFWS indicated in their January 9, 2009 coordination letter that the project area is known to support colonial nesting water birds e.g., herons, egrets, ibis, night-herons and roseate spoonbills). Based on review of existing data and preliminary field surveys, the CEMVN finds that implementation of the TSP would have no effect on colonial nesting water birds.

6.9 Farmland Protection Policy Act of 1981 (Farmland)

The Farmland Protection Policy Act FPPA) is intended to minimize the impact of Federal programs on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Projects are subject to requirements if they may irreversibly convert farmland to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency. In its review of the proposed project the NRCS determined that the TSP will impact 55.4 acres of prime or unique farmland and that the project will not impact NRCS work in the vicinity June 8, 2013 email). No actions will be taken to avoid impacts to farmland.

6.10 Fish and Wildlife Coordination Act of 1934 (Fish & Wildlife)

The Fish and Wildlife Coordination Act FWCA provides authority for the USFWS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It requires Federal agencies that construct, license or permit water resource development projects to first consult with the USFWS, NMFS and state resource agencies regarding the impacts on fish and wildlife resources and measures to mitigate these impacts. Section 2(b) requires the USFWS to produce a Coordination Act Report FWCAR) that details existing fish and wildlife resources in a project area, potential impacts due to a proposed project and recommendations for a project. The draft FWCAR includes the USFWS positions and recommendations. This draft document, CEMVN's responses and coordination planning aid letters are found in Appendix A.

The USFWS, as part of their coordination efforts, provided a map depicting colonial nesting waterbird e.g., herons, egrets, ibis, night-herons, and roseate spoonbills rookeries within the area. Two potentially active rookeries may exist within 1,000 feet of the proposed alignment. USFWS and USACE biologists will survey the area before construction to confirm active rookery locations. If active rookeries exist within 1,000 feet of an alignment, this could be a project constraint. USFWS guidelines would be followed to avoid adverse impacts to these species.

A January 29, 2009, NMFS letter indicates that aquatic and wetland habitats in the area include estuarine emergent wetlands, submerged aquatic vegetation, mud substrates, and estuarine water column. These habitats provide EFH for white shrimp and red drum. Waterbodies and wetlands provide nursery and foraging habitats for a variety of fish species, some of which may serve as prey for other fish species designated as EFH species e.g., mackerel, snapper, and grouper and highly migratory fishes e.g., billfish and sharks). The NMFS letter indicates the area provides foraging and nursery habitat for economically important marine fishery resources including striped mullet, Atlantic croaker, blue crab, and Gulf menhaden. In addition to providing habitat for species with designated EFH, the area is important for Federal and state-managed species. It provides foraging and nursery areas for prey species (gulf menhaden and bay

anchovy Penland et al. 2002) eaten by predators, such as sand seatrout, spotted seatrout, catfish and crappie (LDWF 2009, Hastings 2001 , and highly migratory species.

6.11 Magnuson-Stevens Fishery Conservation and Management Act of 1976 and The Magnuson-Stevens Act Reauthorization of 2006 (Essential Fish Habitat)

The law and its reauthorization govern marine fisheries management in the U.S. Essential Fish Habitat EFH) does not intersect the proposed alignment or the enclosed area in the near term. The CEMVN has determined that the TSP would have no impacts to EFH.

6.12 Marine Mammal Protection Act of 1972 (Marine Mammals)

The Marine Mammal Protection Act MMPA) protects whales, dolphins, sea lions, seals, manatees and other species of marine mammals. The CEMVN finds the TSP would have no effect on marine mammals that may occasionally be found in the project area. To avoid "takings" of the West Indian manatee and ensure compliance with the MMPA, the CEMVN commits that 1) all construction personnel will be educated about the MMPA, the ESA and the West Indian manatee, 2) a search for manatees in the project area and mitigation areas would be conducted before construction, and 3) appropriate best management practices to avoid or minimize potential entrapment of manatees during construction would be implemented.

6.13 Migratory Bird Treaty Act of 1918 and Migratory Bird Conservation Act of 1929 (Migratory Birds)

The Migratory Bird Treaty Act MBTA) and the Migratory Bird Conservation Act MBCA) protect migratory birds and their habitat. Many important habitats in the project area provide migratory bird shelter, nesting, feeding and roosting habitat. The TSP would potentially convert 719 acres of forested wetland/swamp habitat and 55 acres of dry and/or wet BLH habitat to levee. In addition, the TSP would enclose and potentially change hydrologic conditions of up to 8,424 acres of forested wetlands/swamp and BLH habitats. Implementation of the TSP will require compensatory mitigation for unavoidable project-induced impacts to bird and wildlife habitat.

6.14 National Historic Preservation Act of 1966 (Cultural and Historic Resources)

In compliance with Section 106 of the National Historic Preservation Act NHPA) and 36 CFR §800, Federal agencies are required to identify and consider the potential effects that their undertakings might have on significant historic properties, district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. Additionally, a Federal agency shall consult with any tribe that attaches religious and cultural significance to such properties. Agencies shall afford the State Historic Preservation Officer SHPO) and tribes a reasonable opportunity to comment before decisions are made. Any National Register eligible sites would be avoided to the maximum extent possible and any potential adverse effects would be mitigated. A variety of mitigation measures are possible, ranging from avoidance to data recovery to other types of documentation. Mitigation can take place at the site directly affected or can be concentrated at any one site. Decisions on mitigation strategies would be made under a Memorandum of Agreement among the CEMVN, the Louisiana SHPO and any consulting Indian tribes. Sites unevaluated for National Register eligibility would either have to be avoided or further research would be carried out in order to determine National Register eligibility.

The CEMVN has not yet presented a formal conclusion for cultural resources in coordination with the Louisiana SHPO and the Federally-recognized tribes. A letter presenting the alternatives discussed in this document and the research conducted thus far was mailed to the Louisiana SHPO on May 3, 2013. The CEMVN will continue Section 106 consultation and finalize assessment of previous studies and necessary further study during feasibility level design. Compliance with Section 106 will be documented in a final report.

6.14.1 Tribal Consultation (Tribal Interests)

In partial fulfillment of EO 13175 "Consultation and Coordination With Indian Tribal Governments"), NEPA and Section 106, consultation was initiated with Federally-recognized Tribes: Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Quapaw Tribe of Oklahoma, Seminole Nation of Oklahoma, Seminole Tribe of Florida and Tunica-Biloxi Tribe of Louisiana. In a May 3, 2013, letter, the CEMVN summarized the study authority and history of investigations, study area and proposed alignments, offering tribes the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands. The CEMVN will consult with these tribes. Correspondence will be included in the final report.

6.15 Resource Conservation and Recovery Act of 1976, as amended by the Hazardous and Solid Waste Amendments of 1984

A Phase I Environmental Site Assessment ESA is required for all of the USACE Civil Works Projects, to facilitate early identification and appropriate consideration of potential Hazardous, Toxic, and Radioactive Waste HTRW problems. HTRW includes any material listed as a "Hazardous Substance" under Comprehensive Environmental Response, Compensation, and Liability Act CERCLA). Other regulated contaminants include those substances that are not included under CERCLA but pose a potential health or safety hazard, and are regulated. Examples include, but are not limited to, many industrial wastes, naturally occurring radioactive materials NORM , many products and wastes associated with the oil and gas industry, herbicides, and pesticides. Engineer Regulation ER 1165-2-132 and Division Regulation DIVR 1165-2-9 established policies for conducting HTRW review for USACE Civil Works Projects.

The area has a lot of undeveloped property, mostly wetlands. It contains numerous oil and gas wells, with associated waste pits, and pipelines Figure 3-7). The area is heavily industrialized, mainly with facilities associated with oil, gas, and petrochemical production, including the Shell NORCO and Valero St. Charles refineries just outside the project area; there are other industrial facilities within the project area. All these industrial facilities have the potential to be chemical discharge sources, which can occur at unpredictable times. Alignments A, C, and D all have some potential Recognized Environmental Conditions RECs) near or within the alignment, but no RECs have been identified at this time. The TSP will be analyzed during feasibility level project design and a standard Phase I Environmental Site Assessment will be prepared to identify potential RECs and to avoid areas that could contain substances of concern.

6.16 Wild and Scenic River Act of 1968 (Rivers)

The Wild and Scenic Rivers Act establishes a National Wild and Scenic Rivers System. The Louisiana Scenic Rivers Act recognizes and implements the 1968 Federal law, to preserve, protect and enhance the wilderness qualities, scenic beauties and ecological regimes of rivers and streams. Any construction within 100 feet of a scenic stream requires a scenic streams permit. The TSP would not impact the Blind River, the only scenic river within the project area.

6.17 Executive Order 11514, Protection and Enhancement of Environmental Quality

EO 11514 directs Federal agencies to "initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals." The TSP complies with EO 11514.

6.18 Executive Order 11988, Floodplain Management

EO 11988 directs agencies to avoid development in floodplains to the maximum extent feasible. The TSP would reduce risk to the existing structures within the floodplain. The CEMVN is providing storm surge information to inform the St. Charles, St. James and St. John the Baptist Parishes Floodplain Administrators in their floodplain management implementation.

6.19 Executive Order 11990, Protection of Wetlands

Executive Order 11990 directs Federal agencies to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands, and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. Mitigation planning was integrated into the planning by considering, individually and collectively, each of the NEPA mitigation actions of avoiding, minimizing, reducing and rectifying potential adverse impacts to wetlands to the extent practicable. Implementing the TSP requires compensatory mitigation for unavoidable impacts that will require replacing or providing substitute resources. A mitigation plan will be completed during feasibility level design and will be included in the final report. Unavoidable project-induced impacts will be mitigated in-kind, and hence, the proposed action complies with the EO 11990.

6.20 Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

EO 12898 requires agencies to make achieving environmental justice EJ part of their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of programs, policies and activities on minority populations and low-income populations. Potential EJ issues have been considered throughout planning. As part of the NEPA process, public and scoping meetings were held and attention was given to EJ issues. A public meeting specific to EJ issues was held on May 21, 2013 at the Knights of Columbus Hall in Lutcher, Louisiana. During these meetings, information was made available to the public to help assist in the identification of potential EJ issues. The CEMVN has concluded that there would be no potential EJ issues from implementing the TSP. The CEMVN encourages any interested parties to inform the agency of potential EJ concerns.

6.21 Executive Order 13112, Invasive Species

EO 13112 directs Federal agencies to prevent the introduction of invasive species; provide for their control; and minimize the economic, ecological and human health impacts that invasive species cause. The TSP is consistent with EO 13112 to the extent practicable and permitted by law and subject to the availability of appropriations, and within Administration budgetary limits. Relevant programs and authorities to prevent the introduction of invasive species would be used during construction. The CEMVN will not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless the CEMVN has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm would be taken in conjunction with the actions.

6.22 Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

EO 13186 directs Federal agencies to take actions to further implement the Migratory Bird Treaty Act. The TSP has been evaluated for potential effects on migratory birds, with emphasis on species of concern. Many important habitats in the project area provide migratory bird shelter, nesting, feeding and roosting habitat. The TSP would potentially convert 719 acres of forested wetland/swamp habitat and 55 acres of dry and/or wet BLH habitat to levee. The TSP would enclose and potentially change hydrologic conditions of up to 8,424 acres of forested wetlands/swamp and BLH habitats. Implementation of the TSP will require compensatory mitigation for unavoidable project-induced impacts to bird and wildlife habitat.

7.0 PUBLIC INVOLVEMENT (*NEPA REQUIRED)

Public involvement is an important part of planning and decision-making. Agencies, non-governmental organizations, and citizens provided valuable input for TSP.

7.1 Public Meetings and Other Coordination Efforts

Public meetings in the three parish area were held during the study. These meetings included:

- June 6, 2013 - Project update to the CPRAB, Federal Emergency Management Agency FEMA), Louisiana Department of Transportation and Development LDOTD), Federal Highway Administration (FHWA), and other government agencies
- May 21, 2013 - Environmental justice community meeting in St. James Parish
- May 6, 2013 - Project update to CPRAB, FEMA, LDOTD, FHWA, and other agencies
- April 30, 2012 – Project update in St. John the Baptist Parish
- March 19, 2013 - Update to CPRAB, FEMA, LDOTD, FHWA, and other agencies
- February 22, 2013 - Update to CPRAB, FEMA, LDOTD, FHWA, and other agencies
- January 31, 2013 - Update to CPRAB, FEMA, LDOTD, FHWA, and other agencies
- November 15, 2012 - Project update in St. John the Baptist Parish
- February 16, 2011 - Project update to the St. John's Riverlands Civic Association
- January 21, 2009 - Public scoping meeting in St. John the Baptist Parish

Meeting participants were generally most interested in potential levee alignments and impacts to their communities. Other comments focused on the construction schedule, potential impacts to wetlands, the value of hurricane evacuation routes, and funding.

7.2 Draft Report Recipients

This report was distributed to Federal, state, and local agencies; businesses, libraries, and universities; and others. These stakeholders received a copy of the report (Table 7-1 .

Table 7-1: List of report recipients.

Louisiana Congressional Delegation	Louisiana State Senators &	Levee Districts & Floodplain
Senator Mary Landrieu	Jody Amedee, State Senator	Amite River Basin Commission
Senator David Vitter	Randal L. Gaines, State Representative	Lafourche Basin Levee District
Congressman Rodney Alexander	Gregory A. Miller, State Representative	Pontchartrain Levee District
Congressman Charles W. Boustany, Jr.	Ed Price, State Representative	
Congressman William Cassidy	Gary L. Smith, Jr., State Senator	
Congressman John Fleming	Tom Willmott, State Representative	
Congressman Cedric Richmond		
Congressman Steve Scalise		
St. Charles Parish Government	**St. James Parish Government**	**St. John the Baptist Government**
V.J. St. Pierre, Jr., Parish President	Timothy P. "Timmy" Roussel	Natalie Robottom, Parish President
Parish Council	District Conservationist	
Permit Officer	Director of Operations	
	Parish Police Jury	
Town of Gramercy Government	**Town of Lutcher Government**	**Town of Vacherie Government**
Mayor	Clerk	Town Council
Aldermen	Aldermen	
Permit Official		
Federal Agencies		
Advisory Council on Historic Preservation	**Department of Energy:** Office of Environmental Compliance	**Department of Transportation:** Division Administrator, Federal Highway Administration; Southwest Region, Federal Aviation
Department of Agriculture: Carl J. Breville. *Natural Resources Conservation Service:* Kevin Norton, State Conservationist; Michael Trusclair, District Conservationist	**Department of Homeland Security:** *Federal Emergency Management Agency:* Gary Zimmerer, Region VI	**Environmental Protection Agency:** Office of Federal Activities, EIS Filing Section: Region VI, Marine and Wetlands Section; Rhonda Smith, Region VI - Office of Planning and

Department of the Army: Rayford E. Wilbanks, MVD	**Department of the Interior:** *Office of Environmental Policy and Compliance. U.S. Fish and Wildlife Service:* Lacombe Office ; Lafayette Field Office, Jeff Weller, Field Supervisor	**Department of Commerce:** *National Oceanic and Atmospheric Administration:* David Bernhart, Protected Species Division; Richard Hartman, Habitat Conservation Division; NEPA Coordinator, Office of Program, Planning & Integration
State Agencies and Offices		
Honorable Bobby Jindal	**Louisiana Department of Agriculture & Forestry:** Office of Forestry; Mike Strain; Matthew Keppinger, Office of Agriculture & Environmental Science	**Louisiana Department of Public Works**
Lieutenant Governor Jay Dardenne	**Louisiana Department of Environmental Quality:** Environmental Planning Division ; Office of the Secretary; Scott Guilliams	**Louisiana Department of Transportation & Development**
Louisiana Secretary of State	**Louisiana Department of Health & Hospitals:** Office of Public Health, Center for Environmental Health	**Louisiana Department of Wildlife and Fisheries:** Secretary; Maurice B. Watson; Tim Morrison; Gary Lester, Natural Heritage Program
Attorney General's Office	**Louisiana Department of Natural Resources:** Keith Lovell, Interagency Affairs; Charlie Mestayer, Lafayette Field Office; Division of State Lands; Office of Conservation, Surface Mining Division; Consistency Coordinator, Coastal Resources Program	**Louisiana Division of Administration:** State Land Office; State Planning Office
Governor's Office for Coastal Activities	**Coastal Protection and Restoration Authority Board:** Garret Graves	**Louisiana Office of Cultural Development:** Pam Breaux, State Historic Preservation Officer; Division of Outdoor Recreation
Coastal Protection and Restoration Authority: Stephanie Zumo		**Louisiana State Board of Commerce & Industry**
Native American Tribes		
Adai Caddo Indians of Louisiana	Clifton Choctaw Tribe of Louisiana	Point au Chien Tribe
Alabama Coushatta Tribe of Texas	Coushatta Tribe of Louisiana	Quapaw Tribe of Oklahoma
Biloxi Chitimacha Confederation/Bayou	Four-Winds Cherokee Tribe	Seminole Tribe of Florida
Caddo Nation	Grand Caillou/Dulac Band	Seminole Nation of Oklahoma
Chitimacha Tribe of Louisiana	Isle de Jean Charles Band	Tunica-Biloxi Tribe of Louisiana
Choctaw-Apache Tribe of Ebarb	Jena Band of Choctaw Indians	United Houma Nation
Choctaw Nation of Oklahoma	Louisiana Choctaw Tribe	
Media Outlets	**Businesses & Individuals**	**Libraries & Universities**
St Charles Herald Guide	Entergy	St. John The Baptist Parish Library
L'Observateur	Wally Landry, Crucial, Inc.	St. James Parish Library
News Examiner	Donald Landry, South Louisiana Environmental Council	**Louisiana State University:** Craig A. Johnson, Louisiana Geographic Information Center; Charles Wilson,

7.3 Views of the Public

This report is available for public review and comment for 45 days. The final report will include comments received. Comments received at public meetings will be included.

8.0 RECOMMENDATIONS

Information found in this document and further developed during feasibility analysis, as well as input from agencies and comments from the public, will help refine the potential solutions to reduce hurricane and storm surge flood damages to St. Charles, St. John the Baptist and St. James Parishes, Louisiana. These sources of information will assist the USACE Commander in making an informed decision, which will be documented in the final report.

8.1 Recommended Plan

The TSP is Alternative C, which is also the NED plan, which maximizes net benefits consistent with protecting the Nation's environment. Alternative C begins at the west guide levee of the Bonnet Carré Spillway and extends to Hope Canal. The levee then tracks south to a location near the Mississippi River Levee. It is approximately 18.27 miles long and includes 4 pump stations along the alignment. Borrow material would come from the Bonnet Carré Spillway or alternative borrow sources not yet identified. It would also require environmental control structures culverts with flap gates) along the length of the alignment that would be operated during hurricane and tropical storm surge events. See Appendix B for detailed engineering information.

8.2 Plan Implementation

The following sections describe the NFS financing and the division of plan responsibilities.

Federal and Non-Federal Cost-Sharing

The State of Louisiana acting through the PLD, is the NFS for the feasibility phase of the project. The cost-share during the feasibility phase is 50 percent Federal and 50 percent non-Federal. Following the feasibility phase, CPRAB will be the non-Federal sponsor for planning, design, construction, operation, maintenance, repair, replacement and rehabilitation. The cost share for the planning, design and construction of the project will be 65 percent Federal and 35 percent non-Federal. Among other responsibilities, the CPRAB must provide all project LERRDs required for the project and submit any work-in-kind request to the Federal government for the pre-construction engineering, and design PED) of the project. The OMRR&R cost of the project is estimated to be approximately $4,128,075 and is a 100 percent CPRAB responsibility. The project construction cost is estimated to be approximately $880,851,070. These costs are subject to revision as a result of feasibility level design and will be documented in the final report.

8.2.1 Federal Responsibilities

The Federal government will be responsible for PED and construction of the project in accordance with the applicable provisions of Public Law 99-662 WRDA of 1986 . The Government, subject to Congressional authorization and the availability of funds and using those funds provided by the NFS, shall expeditiously construct the project, applying those procedures usually applied to Federal projects, pursuant to Federal laws, regulations, and policies.

8.2.2 Non-Federal Responsibilities

Federal implementation of the project would be subject to the NFS agreeing to comply with applicable Federal laws and policies, including but not limited to the following:

a) Provide 35 percent of total project costs as further specified below:

1. Provide the required non-Federal share of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

2. Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs;

3. Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the project;

4. Provide, during construction, any additional funds necessary to make its total contribution equal to 35 percent of total project costs;

b) Shall not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the non-Federal obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purpose is authorized;

c) Not less than once each year, inform affected interests of the extent of protection afforded by the project;

d) Agree to participate in and comply with applicable Federal floodplain management and flood insurance programs;

e) Comply with Section 402 of the Water Resources Development Act of 1986, as amended 33 U.S.C. 701b-12), which requires a non-Federal interest to prepare a floodplain management plan within one year after the date of signing a project partnership agreement, and to implement such plan not later than one year after completion of construction of the project;

f Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with protection levels provided by the project;

g Prevent obstructions or encroachments on the project including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the level of protection the project affords, hinder operation and maintenance of the project, or interfere with the project's proper function;

h) Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended 42 U.S.C. 4601- 4655 , and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and

maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

i) For so long as the project remains authorized, OMRR&R the project or functional portions of the project, including any mitigation features, at no cost to the Federal government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal government;

j Give the Federal government a right to enter, at reasonable times and in a reasonable manner, upon property that the NFS owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project;

k) Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;

l) Keep and maintain books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 CFR Section 33.20;

m Comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141- 3148 and 40 U.S.C. 3701 – 3708 (revising, codifying and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 et seq.), and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c et seq. ;

n Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the CERCLA, Public Law 96-510, as amended 42 U.S.C. 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal government determines to be required for construction, operation, and maintenance of the project. However, for lands that the Federal government determines to be subject to the navigation servitude, only the Federal government shall perform such investigations unless the Federal government provides the NFS with prior specific written direction, in which case the NFS shall perform such investigations in accordance with such written direction;

o) Assume, as between the Federal government and the NFS, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the Federal government determines to be required for construction, operation, and maintenance of the project;

p) Agree, as between the Federal government and the NFS, that the NFS shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA; and

q Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended 42 U.S.C. 1962d-5b , and Section 103 j of the Water Resources Development Act of 1986, Public Law 99-662, as amended 33 U.S.C. 2213 j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

r Shall not use any project features or lands, easements, and rights-of-way required for such features as a wetlands bank or mitigation credit for any other project;

s) Pay all costs due to any project betterments or any additional work requested by the sponsor, subject to the sponsor's identification and request that the Government accomplish such betterments or additional work, and acknowledgement that if the Government in its sole discretion elects to accomplish the requested betterments or additional work, or any portion thereof, the Government shall so notify the NFS in writing that sets forth any applicable terms and conditions.

9.0 LIST OF PREPARERS (*NEPA Required)

Name	Office	Discipline/Role
Tim Axtman	RPEDS Plan Formulation Branch	Senior Plan Formulator
Christopher Brown	RPEDS Environmental Compliance Branch	HTRW
Troy Constance	Chief, RPEDS	District Quality Control
Travis Creel	RPEDS, Plan Formulation Branch	Lead Plan Formulator
Rob Dauenhauer	Engineering Division, Structures Branch	Structures Design
Nathan Dayan	RPEDS Environmental Planning Branch	Fisheries Resources, Essential Fish Habitat
Pamela DeLoach	Engineering Division, Engineering Control Branch	District Quality Control
Joan Exnicios	Chief, RPEDS Environmental Planning Branch	District Quality Control
Douglas Ferrell	Engineering Division, Design Services Branch	Relocations
Tammy Gilmore	RPEDS Environmental Planning Branch	Wildlife Resources, Endangered Species
Eric Glisch	Engineering Division, Hydraulics and Hydrologic Branch	Water Quality
Richel Green	Engineering Division, Design Services Branch	Relocations
Judith Gutierrez	Real Estate Division	District Quality Control
Rebecca Hill	RPEDS Environmental Planning Branch	Tribal Liaison Coordination
Paul Hughbanks	RPEDS Environmental Planning Branch	Archaeology
William P. Klein Jr.	RPEDS Environmental Planning Branch	Environmental Manager, Environmental Resources Planning, Mitigation, Adaptive Management and Monitoring, Habitat Impacts
Fay Lachney	RPEDS Plan Formulation Branch	Senior Plan Formulator
Patricia Leroux	RPEDS Environmental Planning Branch	Appendices, Vegetation Resources
J. Ben Logan	RPEDS Economics Branch	Socioeconomic Resources
Keven Lovetro	RPEDS Economics Branch	Socioeconomic Resources
Brian Maestri	RPEDS Economics Branch	Socioeconomic Resources
Greg Miller	Chief, RPEDS Plan Formulation Branch	District Quality Control
Kelly McCaffrey	RPEDS Environmental Planning Branch	Aesthetic Resources
An Nguyen	Engineering Division, Civil Branch	Levee Design
Darrell Normand	Engineering Division, Design Services Branch	Cost Engineering
Paul Oakland	Engineering Division, Design Services Branch	Relocations
Hasan Pourtaheri	Engineering Division, Hydraulics and Hydrologic Branch	ADCIRC & Surge Modeling
Miguel Ramos	Engineering Division, Design Services Branch	Cost Engineering
Courtney Reed	RPEDS Economics Branch	Socioeconomic Resources
Jerica Richardson	RPEDS, Plan Formulation Branch	Lead Plan Formulator
Sandra Stiles	RPEDS Environmental Planning Branch	District Quality Control
Christopher Talbert	Engineering Division, Design Services Branch	Relocations
Danielle Tommaso	RPEDS, Plan Formulation Branch	Plan Formulator
Ron Taylor	Engineering Division, Hydraulics and Hydrologic Branch	Interior Drainage
Walter Teckemeyer	Engineering Division, Engineering Control Branch	Project Engineer
Jeff Varisco	Programs & Project Management Division	Project Manager
Jennifer Wedge	Engineering Division, Structures Branch	Structures Design
Debra Wright	RPEDS Environmental Planning Branch	Recreational Resources